UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2003/00850

July 8, 2003

Mr. Lawrence Evans
U.S. Army Corps of Engineers, Portland District
ATTN: Ms. Judy Linton
P.O. Box 2946
Portland, OR 97208-2946

Mr. Thomas Mueller
U.S. Army Corps of Engineers, Seattle District
P.O. Box 3755
Seattle, WA 98124-2255

Re: Programmatic Biological Opinion and Magnuson-Stevens Act Essential Fish Habitat Consultation for Standard Local Operating Procedures for Endangered Species (SLOPES II) for Certain Regulatory and Operations Activities Carried Out by the Department of Army Permits in Oregon and the North Shore of the Columbia River

Dear Mr. Evans and Mr. Mueller:

Enclosed is a biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act on the effects of the proposed revisions to the standard local operating procedures (SLOPES) for certain Department of Army (Corps) activities in Oregon and the north shore of the Columbia River.

Actions covered in this Opinion are expanded from those analyzed in the biological opinion issued on June 14, 2002[1] to include geotechnical drilling and survey activities that often precede construction within the Corps' jurisdictional area, maintenance activities typical of ports and other industrial dock users, and the Corps' own operational activities which are similar to permit actions administered under the Corps' regulatory program. These changes and others are summarized in the consultation history section of this Opinion. Other proposed revisions are intended to refine and simplify the existing SLOPES framework.

This document also serves as consultation for these revisions on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations at 50 CFR Part 600.

Please direct any comments you may have regarding this Opinion to Marc Liverman at 503.231.2336 or Ben Meyer at 503.230.5425, of my staff in the Oregon Habitat Branch Office, or Neil Rickard at 360.753.9090, of my staff in the Washington Habitat Branch Office.

Sincerely,

for Michael R Crouse

D. Robert Lohn
Regional Administrator

[1] NMFS (National Marine Fisheries Service). 2001. Programmatic Biological Opinion and Magnuson-Stevens Act Essential Fish Habitat Consultation for Standard Local Operating Procedures for Endangered Species (SLOPES) for Certain Activities Requiring Department of Army Permits in Oregon and the North Shore of the Columbia River (SLOPES I) (June 14, 2002).

Endangered Species Act - Section 7 Consultation
Biological Opinion

&

Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Revised Standard Local Operating Procedures for Endangered Species
(SLOPES II)
for Certain Regulatory and Operations Activities
Carried Out by the Department of the Army
in Oregon and the North Shore of the Columbia River

Agency:	Army Corps of Engineers, Portland District, Operations and Regulatory Branches Seattle District, Regulatory Branch
Consultation Conducted By:	NOAA's National Marine Fisheries Service, Northwest Region
Date Issued:	July 8, 2003
Issued by:	For Michael R Crouse D. Robert Lohn Regional Administrator
Refer to:	**2003/00850**

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1. INTRODUCTION

The U.S. Army Corps of Engineers (Corps), Portland and Seattle Districts, and NOAA Fisheries propose to revise standard local operating procedures for endangered species (SLOPES) that guide the administration of activities regulated under section 10 of the Rivers and Harbors Act of 1899 and section 404 of the Clean Water Act. Use of the revised SLOPES will assure compliance with the requirements of the Endangered Species Act (ESA) and Magnuson-Stevens Fishery Conservation Act (MSA) and more efficient handling of many minor permit requests. In the Portland District, SLOPES will also be used to guide the completion of habitat improvement projects under sections 206, 536, and 1135 of the Water Resources Development Act, and civil works programs within the range of activities proposed here, such as the construction, maintenance and operation of public boating facilities, that would require a section 404 permit if proposed by any party except the Corps.

The action area for this consultation is the area within the Portland District of the Corps that is also within the range of ESA-listed salmon and steelhead, their designated critical habitats, and essential fish habitat (EFH) designated under the MSA. It also includes the north shore of the mainstem Columbia River, Columbia River sloughs, and adjacent wetlands downstream of McNary Dam within the Seattle District of the Corps. Tributaries to the north shore of the Columbia River, the Columbia River above McNary Dam, and all other areas of the Seattle District are excluded from this action area.

1.1 Background and Consultation History

Structures or work outside the limits defined for navigable waters of the United States require a section 10 permit if the structure or work affects the course, location, or condition of the water body. The law applies to any dredging or disposal of dredged material, excavation, filling, rechannelization, or any other modification of a navigable water of the United States, and applies to all structures, from the smallest floating dock to the largest commercial undertaking. It further includes, without limitation, any wharf, dolphin, weir, boom, breakwater, jetty, groin, bank protection, mooring structures (such as pilings), aerial or subaqueous power transmission lines, intake or outfall pipes, permanently moored floating vessel, tunnel, artificial canal, boat ramp, aids to navigation, and any other permanent or semi-permanent obstacle or obstruction.

Section 404 of the Clean Water Act requires authorization from the Secretary of the Army, acting through the Corps, for the discharge of dredged or fill material into all waters of the U.S., including adjacent wetlands. Discharges of fill material generally include, without limitation: (1) Placement of fill that is necessary for the construction of any structure, or impoundment requiring rock, sand, dirt, or other material for its construction; (2) site-development fills for recreational, industrial, commercial, residential, and other uses; (3) causeways or road fills; (4) dams and dikes; artificial islands; (5) property protection or reclamation devices such as riprap, groins, sea walls, breakwaters, and revetments; (6) beach nourishment; (7) levees; (8) fill for intake and outfall pipes and subaqueous utility lines; (9) fill associated with the creation of ponds; and (10) other work involving the discharge of fill or dredged material. A Corps permit is required whether the work is permanent or temporary. Examples of temporary discharges included dewatering of dredged material before final disposal, and temporary fills for access roadways, cofferdams, storage and work areas.

The Portland District of the Corps issues on average between 600 and 800 permits for these types of activities each year. Nearly all anadromous fish-bearing streams within this area are occupied by ESA-listed species and designated as EFH. The requirements for ESA and EFH consultation on these permits has resulted in a substantial workload for both the Corps and NOAA Fisheries, often with little additional benefit to the species. Many of these activities are minor in nature and consultation results in similar requirements for project approval. The Portland District uses SLOPES described in the Programmatic Biological Opinion issued on March 21, 2001, revised on June 14, 2002, and amended on August 14, 2002,[2] to guide its review of individual permit requests under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act. Proposed actions that are found to be within the range of effects considered in the June 14, 2002 Opinion are issued a permit with conditions. Applications found not be within this range of effects are submitted to NOAA Fisheries for individual ESA and EFH consultation pursuant to requirements of the June 14, 2002 Opinion. Consultation on the SLOPES process was reinitiated in the fall of 2002 for the reasons described below.

Experiences of the Corps and NOAA Fisheries during administration of the June 14, 2002 Opinion and results of the annual monitoring conference have shown that permit applicants and others find the interpretation of some provisions unclear or impractical. Moreover, NOAA Fisheries has completed programmatic consultation on actions that require Department of Army permits but that were not analyzed in the June 14, 2002 Opinion that suggested additional opportunities to broaden the range of activities covered by SLOPES process.[3] New information also became available that was not considered in the June 14, 2002 Opinion regarding the adverse effects of sound pressure waves produced by use of impact drivers to install metal pilings. Finally, the Corps has requested that its own actions similar to those regulated under the section 404 program also be included in this consultation.

Actions completed by the Corps itself are not subject to full regulatory review under section 404 and, in the past, were not explicitly covered by SLOPES. Examples include small projects for aquatic ecosystem restoration, ecosystem restoration projects for the lower Columbia River and Tillamook Bay estuaries, and some modifications of water resources projects to improve environmental quality as authorized by sections 206, 536, and 1135, respectively, of Water Resources Development Acts. Various provisions of the Flood Control Act of 1944, the Federal Water Project Recreation Act of 1965, and language in specific project authorization acts also

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[2] Letter from D. Robert Lohn, NOAA Fisheries, to Lawrence Evans and Thomas Mueller, U.S. Army Corps of Engineers (August 14, 2002) (Amending terms and conditions for SLOPES issued June 14, 2002).

[3] Letter from Lawrence C. Evans, U.S. Army Corps of Engineers, to Michael Crouse, NOAA Fisheries, (December 26, 2002) (requesting programmatic consultation for maintenance and restoration activities conducted by port authorities and commercial/industrial organizations). See, also, NOAA Fisheries (2003).

allow the Corps to construct, maintain, and operate public park and recreational facilities at its projects. Similarly, general operations of Federal river and harbor improvements frequently require the Corps itself to undertake the same type and size of actions typically regulated under the section 404 program and analyzed in this Opinion. To the extent that these operational activities of the Corps comply with all limits on the range of actions evaluated as part of the section 404 regulatory program, including the requirement of individual consultation for projects with unpredictable or site-specific effects that are excluded from this consultation, and also comply with operational monitoring requirements introduced here, those operational activities are also included in this programmatic consultation.

1.2 Description of the Proposed Action

The June 14, 2002 Opinion, pages 3 through 13, and the August 14, 2002 amendment letter describe the SLOPES process used by Corps permit reviewers to help streamline permit evaluations and ensure that regulatory conditions attached each permit will achieve consistent conservation objectives. The revisions to SLOPES being proposed were developed during this consultation with assistance from NOAA Fisheries, and are adopted as terms and conditions of the incidental take statement that accompanies this programmatic Opinion. Although some proposed revisions will expand the types of actions covered under SLOPES, the effects of those additional actions on listed species and their habitats are considered to be minor, repetitive and predictable. Any actions that may have unpredictable or site-specific effects are required to complete an individual consultation and are not covered under this Opinion.

The following summary of proposed clarifications and changes is intended to highlight significant differences between this version of SLOPES and the June 14, 2002 version. New actions proposed for addition to SLOPES related to drilling, surveying, and hydraulic engineering, and to activities conducted by port authorities and commercial/industrial organizations, are described more fully below.

- Under reasonable and prudent measure (RPM) #1 (SLOPES), the Corps will apply performance standards based on functional habitat characteristics, discussed more fully below, to confirm that site restoration and compensatory mitigation (if any) is complete.

- RPM #2 (general conditions for surveying, exploration, construction, operation and maintenance)
    - Covered activities now include routine drilling, surveying and hydraulic engineering activities. These activities are access road construction, drill pad preparation, access road and drill pad reclamation, drilling and sampling operations, mobilization and set up, de-mobilization, boring abandonment, project development surveys, construction surveys, and boundary surveys.

- References to an 'active channel' are changed to 'bankfull elevation' to ensure that references to an in-water work window, measurement of horizontal distances, and similar topics are tied to a consistent datum.[4]
- Approved methods to install steel pilings are added, with new requirements for sound pressure wave attenuation when impact hammers are used to drive steel piles.
- Stormwater management provisions are shortened and simplified. The 6-month 24-hour storm is identified as the water quality treatment design event.
- Site restoration and compensatory mitigation provisions are changed to be consistent with U.S. Environmental Protection Agency (EPA) and Corps guidance.[5] Planning requirements based on a functional site assessment and achievement of performance standards outlined in the RGL are among the new features that better support the site restoration goal.
- The list of actions that require a compensatory mitigation plan to offset long-term adverse effects is revised to include riparian and aquatic habitats displaced by construction of structural stormwater facilities or scour protection; e.g., a footing, facing, head wall, or other protection necessary to prevent scouring or downcutting of a bridge support, culvert, water intake, or utility line.

- RPM #4 (streambank protection)
  - The prior condition that called for matrix analyses to support the choice of bank protection techniques has been deleted. In its place is a more comprehensive list of streambank protection alternatives that allow for natural, habitat forming processes to occur and which applicants may choose from without further analysis or review.

- RPM #6 (water control structures)
  - Coverage of tide gate work has been deleted. The prior condition, based on complex fish passage considerations, proved unworkable for the few projects submitted. Thus, it is withdrawn pending further technical development.

- RPM #7 (road construction, repairs and improvements)
  - Replacement of a bridge pier or abutment below the bankfull elevation is added to the list of projects not authorized by this Opinion.
  - Culvert repairs, upgrades and replacements are explicitly covered.

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[4] 'Bankfull elevation' means the bank height inundated by a 1.5 to 2-year average recurrence interval and may be estimated by morphological features such average bank height, scour lines and vegetation limits.

[5] U.S. Environmental Protection Agency and U.S. Department of the Army, Regulatory Guidance Letter No. 02-2, *Guidance on Compensatory Mitigation Projects for Aquatic Resource Impacts Under the Corps Regulatory Program Pursuant to section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act of 1899* (December 24, 2002), available online at http://www.usace.army.mil/inet/functions/cw/hot_topics/corps_epa.htm.

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- Monitoring requirements now call for an explanation of why a particular stream crossing design was chosen. This will help NOAA Fisheries better understand what may limit adoption of more favorable fish passage technologies.

- RPM #8 (utility lines)
  - This section is modified to to allow dry trenching or plowing only in a naturally (seasonally) dewatered stream or adjacent wetland where the work area can be completely isolated with using silt screens and without the need for any fish salvage.

- RPM #9 (Over-water and in-water structures)
  - The title is changed from 'recreational boating facilities' to 'over-water and in-water structures' to emphasize that the scope of the action includes maintenance and restoration actions related to commercial docks and wharves.
  - Maintenance actions include replacement of existing structural pilings, installation of structural pilings, replacement of fender pilings, piling extensions due to high water, installation of mooring dolphins, replacement of group pilings, replacement or installation of walers or marine fender pads, and reconfiguration of docking structures in existing marinas.
  - Restoration actions include removal of treated wood pilings and removal of large wood obstructions that limit the usefulness of dock and wharf facilities, provided the latter are returned to a site downstream where the wood will continue to provide aquatic functions.
  - A significant addition to this section affects recreational boating. Signs are now required at public boating facilities to minimize the indirect adverse effects of boating by educating the public about pollution and its prevention.

- RPM #11 (maintenance dredging)
  - Maintenance dredging to increase flow to water pumps that do not have an approved fish screen is now excluded. This will ensure that site-specific risk of juvenile mortality due to impingement on ineffective screens, and entrainment into inadequately screened intakes will be considered during individual consultation.
  - Spoil disposal in approved in-water areas is now authorized.

- RPM # 13 (monitoring and reporting)
  - Applicants are no longer required to provide a narrative description of project effects on natural stream function or completed matrices to support choices of streambank protection methods.
  - Monitoring requirements for site restoration and compensatory mitigation are changed to focus on performance measures discussed above, a requirement that will continue until the Corps certifies that the performance measures are met.
  - Monitoring requirements, parallel to those for permit actions, are added to track operational actions completed by the Corps using SLOPES.

1.2.1 Geotechnical Drilling and Survey Activities

As described in the biological opinion issued on February 6, 2003,[6] the following geotechnical drilling and surveying activities occur across Oregon in preparation for numerous construction activities.

Access Road Construction. Construction of access roads for drill vehicles is usually unnecessary because of favorable topography at the site. When access roads are necessary, they are only left in place for the duration of the drilling period. Occasionally, these roads would remain in place if more work, such as additional drilling or instrument installation, monitoring, or highway improvements is anticipated.

Construction of the access roads will involve removing impassable objects and creating a flat surface. Access roads are typically 4.3 meters (m) wide. Sometimes crushed rock is necessary to provide a stable driving surface. Geotextile material will be used to reduce the amount of crushed rock needed, and to make removal and reclamation easier once construction is finished. Truck-mounted drills may require more extensive access road work due to grade limitations and traction requirements. A track-mounted drill can generally maneuver across terrain that is steeper, more uneven and less stable than a truck-mounted drill, and will cause less ground disturbance. Additionally, water tankers and support vehicles may need to approach the drill site depending on site conditions and the type of operation.

Drill Pad Preparation. Drill pads are the areas where the drill rig and support equipment are parked when the drill is operating. Usually, the pad is twice the size of the drill equipment to satisfy site safety requirements, and tool and supply storage. However, the size of a drill pad is often reduced to minimize ground disturbance. The drilling rig is stabilized using hydraulic leveling jacks that require a level pad. If a pad location had irregular or steep terrain, it would need to be graded to provide a level surface for placement of the drill equipment. The leveling is critical to drilling success and time spent.

Drilling and Sampling Operations, Mobilization, and Setup. Drilling and sampling methods vary depending on the project. The method selected depends on the anticipated subsurface conditions at the site. Methods used to wash cuttings from the bore vary from compressed air to water and drilling mud.

Sampling techniques involve inserting and retrieving sampling instruments in the boring during the drilling process. Other exploration methods might include digging test pits with tire or track mounted backhoes, or shallow borings with hand tools (hand augers or probes). On the typical exploratory operation, the drill rig is driven onto the site and drill pad. Sometimes drill pads are

[6] NOAA Fisheries. 2003. Programmatic Biological Opinion on the Federal Highway Administrations' Programmatic Consultation for Statewide Drilling, Surveying, and Hydraulic Engineering Activities in Oregon (February 6, 2003) (refer to: 2002/00251).

necessary where the ground surface is uneven. The mast is raised and the drill rig is leveled using hydraulic leveling jacks. Wooden blocks and/or metal plates are placed under the jacks to minimize the potential for jacks sinking into the soil. If a drilling pad is not available, the site is cleared around the sides and back of the drill to allow room to work. Typically, this requires cutting brush and removing obstacles for a few feet on each side of the drill rig, and in an area (approximately 9 m x 2.5 m) at the rear of the drill. If the site is muddy, the setup may also require spreading straw around the rig to provide a slip-free working area.

If water is required for drilling, a water tanker is parked as close to the drill rig as possible. When necessary, small ditches or berms with appropriate sediment and erosion controls are constructed to move water resulting from the drilling process away from the work site. A support vehicle is usually parked as near to the drill as possible to provide easy access to tools and supplies. If this is not possible, supplies are carried by hand or loaded on a small tracked all-terrain vehicle (ATV) and shuttled into the drill site. Most impacts associated with mobilization and setup occur during the construction and reclamation of the drill pad. If a drill pad is not constructed, impacts that may occur during a drill set-up include vegetation removal for access, and sediment runoff from ditches excavated to keep the site dry.

Auger Drilling. Auger drilling involves attaching an auger, with a carbide-toothed bit attached at the bottom, to the rotary drive spindle of the drill. The drilling is accomplished by rotation and downward pressure applied to the auger by the drill. If more depth is required than is provided by the lead flight of the auger (normally 1.5 m or less), additional flights (normally 1.5 m long) are attached, and the drilling is advanced to the necessary depth.

Soil recovered from the drilling is typically spread out over the site and stabilized by seeding and mulching. The material can be removed from the site by placing it in barrels that are later removed from the drill site. If no instrumentation is installed in the drill borings, they are abandoned by filling them with bentonite chips, pellets, or cement-bentonite grout. The minimum equipment necessary for this type of drilling operation includes a truck or track mounted drill with either solid or hollow stem augers (with/without continuous sampler apparatus), one or more support vehicles, and a shovel.

Water or Mud Rotary Drilling. This method of drilling consists of advancing drill steel into the ground by applying rotation and downward pressure to the drill steel and bits. Water or drilling mud (fluid) is pumped down inside the drill steel to the bottom of the boring where it exits the bit. The fluid lubricates the bit and forces drill cuttings up through the boring annulus (area between the drill steel and the edges of the drill boring) and toward the ground surface. From zero to 18,900 (L) per day of drilling fluid can be generated during this type of drilling. However, frequently after drilling begins, the drill fluid return ceases as the fluid is lost through more permeable zones of subsurface materials. When drill fluid returns to the surface, three different methods are used to control pollution and erosion:

1. Drill fluid and cuttings may be allowed to flow freely out of the boring before it is diverted across the ground surface through the existing vegetation. The sediment laden

water is allowed to sheet flow over the surface, through existing vegetation, before infiltrating into the ground. This method is typically used where the threat to fish habitats is small, usually away from streams. In more sensitive environments, a ‘dirt bag’ is used to contain the returned drilling fluid and collect larger particles before site infiltration. The filter and collected sediment are then removed from the site.

2. Routing the drill fluid return to a sediment retention structure. The drill fluid can be directed to a temporary sediment pond or containment system where the sediment-laden water is contained. Sediment settles to the base of the containment system and the water infiltrates into the ground. The water remaining in the pond may be reused in the drilling process. These ponds are constructed in areas that are already degraded or will create minimal new impacts. When drilling is complete, the water in the containment system is allowed to infiltrate in situ or it can be pumped to an acceptable location nearby for infiltration. Sediments remaining in the containment system can either be buried at the pond location or removed from the site. When buried on a site, the disturbed material is stabilized by seeding and mulching. Drilling fluid will be diverted as necessary to avoid environmentally sensitive areas, such as wetlands, vernal pools, and streams.

3. Re-circulating the drilling fluid by filtering it and then reusing the fluid. In this method, drilling fluids are captured, isolated and recirculated as they flow out of the boring. The drill cuttings settle within the tank and an adequate supply of water is maintained for drilling. When drilling is complete, the fluid is either disposed of at the site through existing upland vegetation, or pumped to an approved location for disposal. Sediments collected are buried or mounded on site, and the area is seeded and mulched.

In-water Drilling. Two primary situations may require drilling in a wetted stream channel: (1) When an area expected to be dry is wet due to wetter-than-normal water years; or (2) when the margin of the wetted stream channel must be drilled. In these cases, the drilling equipment is isolated from the water via a small platform or construction of a coffer dam to isolate the work area from the stream. A sleeve or casing is then placed where the drilling would occur. This casing enables collection of drilling fluids similar to methods 2 and 3, outlined above. The drilling fluids are disposed of periodically at an upland location. A small pulse of turbidity may result when the drill penetrates the top layer of the substrate. When the sleeves are removed after drilling, some residual fluids may escape. After completion, each boring is filled with bentonite. The drill crew and geology manager must closely observe flow stage and weather conditions to maintain an environmentally safe work site. Borings generally take from 1 to 3 days to complete.

Drilling often takes place from the deck of a highway bridge. A diamond-cutting device is used to cut through the concrete and rebar in the bridge deck. Containment measures are placed to capture any debris from the cutting of the bridge deck. A casing of sufficient size is extended from the deck to the bottom of the waterway. This casing is embedded into the substrate, providing a seal that isolates the drill steel and the fluids from the water. The drilling fluids are returned up through the casing to the bridge deck and captured in a collection tank. The drilling fluids are disposed of periodically at an upland location. Sometimes, an additional casing is needed to contain the drilling fluids adequately. A small pulse of turbidity may result when the drill penetrates the top layer of the substrate. When the sleeves are removed after drilling, some residual fluids may escape. After completion, each boring is filled with bentonite. Borings generally take from 1 to 3 days to complete.

Environmental (Hazardous Material) Drilling. Environmental drilling is conducted using a variety of methods, primarily geoprobe drilling or auger drilling. Fluids are not typically used when drilling for hazardous materials samples. A geoprobe is used for hazardous material exploration and is mounted on the back of a standard pickup or similar vehicle. Sampling is conducted by driving a 2.5 centimeter steel probe into the ground. Samples are collected in hollow tubes and capped for later analysis. This activity uses no fluids. When auger drilling, the cuttings are placed on plastic sheeting and covered, or in labeled barrels. Soil samples are lab-tested and properly disposed of under Oregon Division of Environmental Quality (DEQ) guidelines.

Decontamination is required during environmental drilling operations. Decontamination is achieved as follows:

1. Decontamination of split spoons between samples. The split spoon is submersed in a bucket of soapy water and scrubbed off between samples, then rinsed in deionized water. The soap breaks down petroleum products into inert organic compounds. If the contamination is petroleum-based and at low levels, the waste water is dumped on site. If the contamination is other than petroleum, the water is contained in a barrel on site, the barrel is labeled, and a sample is obtained for lab testing. If the lab determines that the sample is not contaminated, the water is discharged on site. If the sample is contaminated, the barrels are removed from the site and handled per DEQ and EPA specifications for the waste product. The typical amount of water produced through this activity is approximately 15 L per boring.

2. Decontamination of drilling steel and bits between borings. The drill steel and bits are generally decontaminated at the drill site. Occasionally they are hand-loaded onto a trailer on a sheet of plastic and hauled to the steam cleaner nearby or at a maintenance station. The steel parts are loaded onto the steam cleaner rack for cleaning. The waste wash-water or water with alconox is contained in a holding tank attached to the steam cleaner. If the steel is too big to fit over the holding tank, it is washed in a portable tank consisting of plastic sheeting surrounded by straw bales to contain the water. The used wash water is usually stored on-site in labeled barrels for lab testing. Rarely, it is stored in the tank and allowed to evaporate.

In situations where the water is likely contaminated, the barrels are stored in a secondary containment area to avoid spills (this is typically plastic sheeting which is bermed with straw bales on all edges to create a 'tank'). The water varies from 76 to 380 L, depending on how much steel is being cleaned and how much soil is sticking to the steel. The water testing takes approximately five days. If the tests show the water is clean, it is discharged on site. If the water is contaminated, the barrels are lifted onto a trailer and hauled off site and disposed of according to DEQ regulations for the waste product. If the water is stored and allowed to evaporate, the residue is tested and removed to a suitable disposal site.

Drill Boring Instrumentation. This activity consists of placing materials, instruments and/or equipment into a completed boring (air or water/mud rotary, auger, or geoprobe) for measuring or monitoring various *in situ* parameters over an extended period. Placement of instruments is usually done immediately upon completion of the boring utilizing most of the same equipment used in the drilling process. Borings are often backfilled with grout once the instruments have been installed. Grout is mixed with a grout pump that is trailer mounted and towed to the site behind a support vehicle, or in a tank or trough with a hand mixer. Materials used during boring instrumentation include grout made from Portland cement and powdered bentonite. Sometimes, all or part of a bore hole might be backfilled with clean silica sand or bentonite pellets, rather than grout. Casing installed in instrumented borings ranges from 1.3 to 20 cm (plastic) inclinometer casing or smaller diameter schedule 40 PVC. A flush-mount monument cover made of steel or concrete is installed to protect against accidents or vandalism. No additional impacts are likely from this activity beyond those described above for drilling operations, except the potential of contamination to the ground surface and nearby streams or wetlands from excess grout.

Air Rotary Drilling. Air rotary drilling equipment range in size from small skid or track mounted rigs to large air rotary rigs used for water well drilling. This method of drilling uses an air-powered hammer and compressed air. The air is forced down the casing and through the bit, blasting the cuttings back to the surface. This method uses no drilling fluids; however, a foaming agent is often used to help float the cuttings out of the boring. Once the boring advances below the water table, water is blasted (usually as a mist) out of the boring along with cuttings.

Test Pits. Test pits are dug using a trackhoe or rubber-tired backhoe to describe subsurface conditions and provide detailed, large-scale geologic information. This data is gathered from examination of the excavation walls and material. These pits are typically less than 6 m deep and about the width of the bucket. The soil from the pit is side-cast next to the boring and placed back into the boring at completion.

Soil Testing. Soil testing is conducted by lowering a split spoon sampler in the boring and hammering repeatedly with a 64 kg mechanical hammer until the split spoon penetrates 0.5 m into the soil at the bottom of the boring. The hollow sampler attains the desired sample. This test is generally completed often at regular depth intervals within the test boring. The types of testing and sampling, include Vane Shear testing, pressure meter testing, Shelby (thin-wall) tube sampling, and cone penetrometer testing. Typical equipment used for soil testing includes: Drill rig, support truck, drilling steel and bits, and drill steel racks.

Demobilisation and Boring Abandonment. During demobilisation, the drill rig tower is lowered, the leveling jacks are retracted, and all tools and supplies are loaded onto the drilling rigs and support vehicles. All waste is removed, sometimes including soil and water. The boring is abandoned and vehicles are removed from the site. Erosion control devices that are no longer needed are removed. Any absorbent materials used to contain leaks are removed from the site.

Boring abandonment is conducted after completion of boring and the boring is no longer needed is required under Oregon Department of Water Resource regulations. This activity also consists of removing any temporary instrumentation, usually by drilling out whatever has been installed and filling the boring with grout, bentonite chips or pellets, or similar material.

The boring is backfilled so that groundwater cannot migrate between aquifers, vertical mobility of groundwater will not increase compared with conditions before the boring, and surface water cannot enter the boring. Materials used for boring abandonment include cement grout, bentonite pellets or powder, concrete, and native material.

Project Development, Construction, and Boundary Surveys.

- Project Development Surveys. Surveying for project development is essential to provide designers information on all the features found within the project area. These include the following types of surveys: (a) Roadside inventory, utility surveys, project control establishing vertical & horizontal benchmarks, topographic surveys, drainage studies, stream profile analysis, photogrammetry, and cadastral surveys. (b) Size of culverts, direction of flow and position of any drainage features in the stream or waterbody. Stormwater and hydraulic field activities may also include investigating the condition of hydraulic structures and adjacent ground and vegetation either visually and/or by probing, sampling channel material, streamflow gaging, water sampling, turbidity monitoring, photographing features, and identification and temporary flagging of geomorphic features such as high-water marks. (c) Stream profile analysis provides information on the open water features of a stream such as channel width and depth, ordinary high water marks, and meander channel.

- Construction Surveys. Surveying for construction control is necessary to provide contractors precise information on where and how a roadway is to be constructed. Stakes are placed along the proposed roadway routes that provide contractors specific details for the construction of the road. Components of construction control include: Moving control points, establishing centerlines, placing slope stakes and temporary stakes for right-of-way (ROW) & easements, staking for water detention ponds/bioswales, staking for wetland/stream mitigation, stream relocation, erosion control boundaries, determining drainage patterns, and staking for structures including bridges, culverts, and grade hubs.

- Boundary Surveys. Boundary surveys are conducted to establish or reestablish a boundary line on the ground or to obtain data for constructing a map or plat showing a boundary line. Boundary surveys are to determine property ownership along a specific route and establish rights-of-way along the route.

Besides general conservation measures (permit conditions) for construction activities, described in the June 14, 2002 Opinion and below in the Effects of the Action section, the Corps has proposed the following conservation measures for all geotechnical and drilling actions:

- Hydraulic measurements that require access to the wetted channel will be done outside of the spawning season, or will have a biologist verify that there are no redds present at the site.
- Use of access roads will be avoided by using a crane to lower drilling equipment whenever feasible.
- Drilling pads will be designed to disturb the minimum area and to contain any spills that may occur, and will be constructed using the same conservation measures required for access road construction, including use of geotextile material and complete removal after the work is completed.
- Drilling will be completed in the dry, whenever feasible.
- Drilling pads and fluids near streams or other water bodies will be isolated using fluid recirculation, bio-bags, swale filtration, silt fencing, straw bails, sediment ponds, ditches or berms, as appropriate for site conditions.
- Any contaminated material collected at a drilling site will be stored securely until it can be safely removed for off-site disposal, including water produced during drilling or used for decontamination.
- All water produced during drilling will be contained until decontaminated.
- Spider hoes will be used when test pits must be excavated to eliminate the need for access road construction.

1.2.2 Maintenance and Restoration of Port, Industrial, and Marina Facilities

Maintenance actions proposed for existing port, industrial, and marina facilities include replacement of existing structural pilings, installation of structural pilings, replacement of fender pilings, piling extensions due to high water, installation of mooring dolphins, replacement of group pilings, replacement or installation of walers or marine fender pads, and reconfiguration of docking structures in existing marinas. Proposed restoration actions include removal of treated wood pilings and removal of large wood obstructions that limit the usefulness of dock and wharf facilities, provided the latter are returned to a site downstream where the wood will continue to provide aquatic functions.

Besides repair to above-water parts of existing structures, piling replacement or installation requirements far outweigh other port, industrial and marina maintenance activities. Annual inspections consistently reveal many pilings that are degraded or damaged due to ship/boat activity. Generally, three types of bearing piles are used at piers or wharves: fender piles, structural piles and group piles. Fender piles are used in front of marine structures to absorb and dissipate the impact energy of ships. They also provide a barrier to prevent vessels from moving under piers. Structural piles are used to support the load of piers and wharves. Bracing between piles is used to increase the strength and stiffness of the foundation for the structure. Groups of piles, known as dolphins, are placed near piers to guide vessels into moorings, fend vessels away from structures, or to serve as mooring points.

Piles are typically placed by jetting or driving them into place. Sometimes, holes may have to be drilled or augered into hard substrates before placement of the piles. Timber pilings have traditionally been the material of choice for piling work. This is due to the relatively low cost of wood and availability. However, untreated timber pilings are susceptible to degradation and typically have a life span of two years or less. Treated timber pilings have a life span of approximately 5-7 years but pose environmental concerns over the release of wood preservatives (*e.g.*, creosote, pentachlorophenol, ammonical copper zinc arsenate) into the waterway. Marine product manufacturers have designed in recent years fiberglass-reinforced and steel-reinforced plastic pier pilings designed for low maintenance and to have similar structural properties as timber pilings. These pilings are mostly of high density polyethylene (HDPE) plastics reinforced with fiberglass bars, a steel pipe core, or a welded steel cage.

Fender pads or walers are added to the face of docks or structures to protect fender piles from excessive force or rubbing by vessels. Marine product manufacturers have designed fender pads systems typically using HDPE or other polyethylene plastic compounds with fiberglass reinforcement. These are commonly called fiberglass reinforced plastic (FRP) lumber or HDPE marine fender pads.

Site preparation for the construction of reconfigured docking facilities within an existing marina may require the removal of existing fixed or floating docking structures. The removal of fixed docking structures may include the removal of existing piling at or below the mudline. The reconfiguration of docking facilities may be accomplished by shortening, extending, reorienting existing docking structures, construction of new docking structures or a combination of these methods within the existing marina. Replacement of decking, rails, stringers, or other above-water parts on existing structures may occur.

Proposed restoration activities for port, industrial and marina facilities include removal of treated wood piling, unused overwater structures, abandoned structures, and submerged logs or other obstructions to navigation. Removal of unused overwater coverage like deteriorated decking at moorage facilities would be done to ensure that no material enters the waterway. All materials would be disposed of in an approved upland site.

The Corps has proposed the following general conservation measures for all maintenance and restoration actions involving port, industrial, and marina facilities:

- No sheet piling will be used instead of pole piling.

- Projects using treated wood[7] that may contact flowing water or that will be placed over water where it will be exposed to mechanical abrasion or where leachate may enter flowing water are not authorized, except for pilings installed following NOAA Fisheries' guidelines.[8] If treated wood pilings are used, they must incorporate design features to minimize abrasion of the treated wood from vessels, floats or other objects that may cause abrasion of the piling.
- Existing pilings may be partially cut with new pile secured directly on top, fully extracted, or cut 3 feet below the mudline.
- Existing pilings will be removed with a vibratory hammer; no hydraulic water jets will be used to remove piles.
- If treated piles break during removal, the holes or piles will be capped with appropriate material (such as clean sand, or plastic or steel pile cap for cut piles) to ensure that the chemicals from the existing pile do not leach into nearby sediments or the water column.
- Replacement of above-water parts on existing structures will ensure that any stain, paint, or preservative to be applied on such components is completely dried/cured before installation.
- No material will enter the waterway during removal of above-water parts.
- Marina structures may only be moved within the existing footprint of the moorage or into deeper water.
- Most of the structures (including all structures wider than 8 feet, and all structures to which boats will be moored overnight) will be placed in waters greater than 20 feet in depth. Moorage floats and boats will be spaced so that the shadow cast by the boat/float combination will not reduce light by more than 60% of ambient. Boats will be moored in water deep enough so that they never ground out or prop wash the bed in the moorage or channel area.
- Where deep water (greater than 20 feet) is found close to shore, all structures will be placed 50 feet or more away from the shoreline.
- All floats will not ground out at low water, and at least a foot of depth will be maintained between the river bed and the bottom of any float.
- New marinas, house boats, live-aboards and fueling facilities are not covered under this consultation.
- Any pier or ramp used to connect the dock to the shoreline will be elevated above the water line and be eight feet in width or less.
- Flotation will be entirely contained and enclosed permanently to prevent the breakup or loss of flotation material.

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[7] 'Treated wood' means lumber, pilings, and other wood products preserved with alkaline copper quaternary (ACQ), ammoniacal copper arsenate (ACA), ammoniacal copper zinc arsenate (ACZA), copper naphthenate, chromated copper arsenate (CCA), pentachlorophenol, or creosote.

[8] Letter from Steve Morris, National Marine Fisheries Service, to W.B. Paynter, Portland District, U.S. Army Corps of Engineers (December 9, 1998) (transmitting a document titled *Position Document for the Use of Treated Wood in Areas within Oregon Occupied by Endangered Species Act Proposed and Listed Anadromous Fish Species, National Marine Fisheries Service, December 1998*).

- Only floating breakwaters in water deeper than 20 feet and no closer than 50 feet from the shoreline will be used for wave attenuation.
- In instances where structures wider than 6 feet must be landward of minus 20 feet, they will include grating or translucent panels such that light under the structure is at least 60% of ambient open water light.
- The last four feet of all finger piers and walkways will be grated such that light under the piers and walkways is at least 60% of ambient open water light.
- Roofs and walls for covered moorages and boat houses will be constructed of clear or translucent panels.
- All pilings installed or replaced will be capped with bird excluder devices.

2. ENDANGERED SPECIES ACT

The Endangered Species Act (ESA) (16 U.S.C. 1531-1544), amended in 1988, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with USFWS and NOAA Fisheries, as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their designated critical habitats. This Opinion is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations found at 50 Code of Federal Regulations (CFR) Part 402.

2.1 Biological Opinion

The objective of the ESA portion of this programmatic consultation is to determine whether adoption of the proposed revisions to SLOPES guiding the Corps' administration of activities regulated under section 10 of the Rivers and Harbors Act of 1899 and section 404 of the Clean Water Act are likely to jeopardize the continued existence of ESA-listed species, or cause the destruction or adverse modification of designated critical habitats. BAs provided by the Corps with requests for consultation, described below, included the finding that actions permitted using the proposed revisions to SLOPES are 'likely to adversely affect' the following 14 ESUs[9] listed, or proposed for listing, under the ESA.

- Southern Oregon/Northern California Coasts (SONC) coho salmon (*Oncorhynchus kisutch*)
- Oregon Coast (OC) coho salmon (*O. kisutch*)
- Snake River (SR) Fall-run chinook salmon (*O. tshawytscha*)
- SR spring/summer-run chinook salmon (*O. tshawytscha*)

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[9] 'ESU' means a population or group of populations that is considered distinct (and hence a 'species') for purposes of conservation under the ESA. To qualify as an ESU, a population must (1) be reproductively isolated from other conspecific populations, and (2) represent an important component in the evolutionary legacy of the biological species (Waples 1991).

- Lower Columbia River (LCR) chinook salmon (*O. tshawytscha*)
- Upper Willamette River (UWR) chinook salmon (*O. tshawytscha*)
- Upper Columbia River (UCR) spring-run chinook salmon (*O. tshawytscha*)
- Columbia River (CR) chum salmon (*O. keta*)
- SR sockeye salmon (*O. nerka*)
- UCR steelhead (*O. mykiss*)
- SR Basin steelhead (*O. mykiss*)
- LCR steelhead (*O. mykiss*)
- UWR steelhead (*O. mykiss*)
- Middle Columbia River (MCR) steelhead (*O. mykiss*)

2.1.1 Biological Information and Critical Habitat

Biological information and critical habitat descriptions for the 14 listed ESUs included in this consultation were described in the June 14, 2002 Opinion. Subsequently, critical habitat designations were withdrawn for all relevant ESUs except SR sockeye salmon, SR spring/summer-run chinook salmon, SR steelhead, and SONC coho.[10] Essential elements of critical habitat for the listed ESUs with designated critical habitat are: (1) Substrate; (2) water quality; (3) water quantity; (4) water temperature; (5) water velocity; (6)cover/shelter; (7) food (juvenile only); (8) riparian vegetation; (9) space; and (10) safe passage conditions (50 C.F.R. 226). Based on migratory and other life history timing, it is likely that adult and juvenile life stages of these four ESUs with designated critical habitat would be present in part of the proposed action area where activities authorized by SLOPES may be carried out. Those actions can degrade each these essential habitat features, although the combination of elements affected and the effects would vary by the type of action.

Moreover, for the past year, NOAA Fisheries has been working with state, tribal and other Federal biologists to develop the updated information and analyses needed to re-evaluate the status of the 27 ESUs of Pacific salmon and steelhead, including the 14 ESUs that occur in the proposed action area. NOAA Fisheries' Biological Review Team (BRT) for Pacific salmon and steelhead met recently to review this updated information, and to draw preliminary findings about the status of each ESU.[11]

As in the past, the BRT used a risk-matrix method to quantify risks in different categories within each ESU. In the current report, the method was modified to reflect the four major criteria

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[10] On April 30, 2002, the U.S. District Court for the District of Columbia adopted a consent decree resolving the claims in National Association of Homebuilders et al. v. Evans, Civil Action No. 00-2799 (CKK)(D. D.C., April 30, 2002). Pursuant to that consent decree, the court issued an order vacating critical habitat designations for a number of listed salmonid species.

[11] Results of the BRT review are published in a report titled *Preliminary Conclusions Regarding the Updated Status of Listed ESUs of West Coast Salmon and Steelhead*, available online at http://www.nwfsc.noaa.gov/cbd/trt/brt/brtrpt.html.

identified in NOAA Fisheries' Viable Salmonid Populations (VSP) document: Abundance, growth rate/productivity, spatial structure, and diversity (McElhaney *et al.* 2000). These criteria are being used as a framework for approaching formal ESA recovery planning for salmon and steelhead. Tabulating mean risk scores for each element allowed the BRT to identify the most important concerns for each ESU and make comparisons of relative risk across ESUs and species. These data and other information were considered by the BRT in making their overall risk assessments. Based on provisions in the draft revised NOAA Fisheries' policy on consideration of artificial propagation in salmon listing determinations, the risk analyses presented to the BRT focused on the viability of populations sustained by natural production.

The status review updates were undertaken to allow consideration of new data that have accumulated since the last updates and to address issues raised in recent court cases regarding the ESA status of hatchery fish and resident (nonanadromous) populations. The draft BRT conclusions in this report should be considered preliminary for two reasons. First, the BRT will not make final status recommendations until state, tribal, and other Federal co-managers have had an opportunity to review and comment on the draft report. Second, some policy issues regarding the treatment of hatchery fish and resident fish in ESU determinations and risk analyses are not resolved at this time.

For the following ESUs considered in this Opinion, the majority BRT conclusion was 'in danger of extinction': UCR spring-run chinook, UCR steelhead, and SR sockeye. For the following ESUs, the majority BRT conclusion was 'likely to become endangered in the foreseeable future': SR fall-run chinook, SR spring/summer-run chinook, LCR chinook, UWR chinook, SR steelhead, MCR steelhead, LCR steelhead, UWR steelhead, OC coho, SONC coho, and CR chum.

In some ESUs, adult returns over the last 1-3 years have been significantly higher than have been observed in the recent past, at least in some populations. The BRT found these results, which affected the overall BRT conclusions for some ESUs, to be encouraging. For example, the majority BRT conclusion for SR fall chinook salmon was 'likely to become endangered,' whereas the BRT concluded at the time of the original status review that this ESU was 'in danger of extinction.' This change reflects the larger adult returns over the past several years, which nevertheless remain well below preliminary targets for ESA recovery. In the UCR, the majority BRT conclusions for spring chinook salmon and steelhead were still 'in danger of extinction,' but a substantial minority of the votes fell in the 'likely to become endangered' category. The votes favoring the less severe risk category reflect the fact that recent increases in escapement have temporarily alleviated the immediate concerns for persistence of individual populations, many of which fell to critically low levels in the mid 1990s.

Overall, although recent increases in escapement were considered a favorable sign by the BRT, the response was uneven across ESUs and, sometimes, across populations within ESUs. Furthermore, most of these recent increases have not yet been sustained for even a full salmon/steelhead generation. The causes for the increases are not well understood. Many (perhaps most) cases may be due primarily to unusually favorable conditions in the marine environment rather than more permanent alleviations in the factors that led to widespread declines in abundance over the past century. Overall, the BRT felt that ESUs and populations would have to maintain themselves for a longer time at levels considered viable before it could be concluded that they are not at significant continuing risk.

These preliminary findings focus solely on the naturally spawning portion of each ESU, and do not take into account the future effects of ongoing salmon conservation and recovery efforts. These findings do not represent any determination by NOAA Fisheries regarding whether particular ESUs should remain listed under the ESA. Following this review and technical discussions with co-managers, the panel will prepare a revised Part 1 report.

When completed, this draft report would represent the first major step in the agency's efforts to review and update the listing determinations for all listed ESUs of salmon and steelhead. By statute, ESA listing determinations must take into consideration not only the best scientific information available, but also those efforts being made to protect the species. After receiving the final BRT report and after considering the conservation benefits of such efforts, NOAA Fisheries will determine what changes, if any, to propose to the listing status of the affected ESUs.

2.1.2 Evaluating the Proposed Action

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR 402 (the consultation regulations). NOAA Fisheries must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify critical habitat. This analysis involves the initial steps of: (1) Defining the biological requirements of the listed species; and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries must consider the estimated level of mortality attributable to: (1) Collective effects of the proposed or continuing action; (2) the environmental baseline; and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed species' life stages that occur beyond the action area. If NOAA Fisheries finds that the action is likely to jeopardize, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

NOAA Fisheries also evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' critical habitat. NOAA Fisheries must determine whether habitat modifications appreciably diminish the value of critical habitat for both survival and recovery of the listed species. NOAA Fisheries identifies those effects of the action that impair the function of any essential element of critical habitat. NOAA Fisheries then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NOAA Fisheries concludes that the action will adversely modify critical habitat, it must identify any reasonable and prudent alternatives available.

For the proposed action, NOAA Fisheries' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NOAA Fisheries' critical habitat analysis considers the extent to which the proposed action impairs the function of essential elements necessary for migration, spawning, and rearing of the listed species under the existing environmental baseline.

2.1.3 Biological Requirements

To fully consider the current status of the listed species (50 CFR section 402.14(g)(2)), NOAA Fisheries evaluates the species-level biological requirements of a species, subspecies or a distinct population segment level. For Pacific salmonids, NOAA Fisheries evaluates species level biological requirements as they relate to the distinct population segment level, or ESU. The biological requirements and the status of listed species are evaluated at both the ESU level and the action area level, and may be described in a number of different ways. For example, biological requirements can be expressed in terms of population viability using such variables as the ratio of recruits to spawners, a survival rate for a given life stage, a positive population trend, or a threshold population size. Biological requirements can also be described as the habitat conditions necessary to ensure the species' continued existence, and these can be expressed in terms of physical, chemical, and biological parameters (NMFS 1999). These are briefly described below.

Since 1995, NOAA Fisheries has employed the viable salmonid population (VSP) concept as a tool to evaluate whether the species level biological requirements of ESUs are being met. VSPs are independent populations that have a negligible risk of extinction due to threats from demographic variation (random or directional), local environmental variation, and genetic diversity changes (random or directional) over 100 years (McElhany *et al.* 2000).

The attributes associated with VSPs include adequate abundance, productivity, population growth rate, population spatial scale, and diversity. These attributes are influenced by survival, behavior, and experiences throughout the entire life cycle and are therefore distinguished from the more specific biological requirements associated with the action area and the particular action under consideration. Species-level biological requirements are influenced by all actions affecting the species throughout its life cycle and may be broader than the requirements of any specific independent population in the ESU. The action area effects must be reviewed in the context of these species-level biological requirements to evaluate the potential for survival and recovery, relevant to the status of the species and given the comprehensive set of human activities and environmental conditions affecting the species. Recent information reviewed by NOAA Fisheries indicates that the species level biological requirements are not being met in any of the ESUs studied for 12 species of listed salmonids in the Columbia-Snake River basins (NMFS 2000a). Given the low abundance levels in these ESUs, population growth rates must increase to reach the critical threshold or recovery abundance levels, and in the long term, must remain high enough to maintain a stable return rate and keep populations at acceptable abundance levels (NMFS 2000a).

Habitat-altering actions continue to affect salmon and steelhead population viability by affecting the physical, chemical, and biological parameters central to salmon survival in freshwater ecosystems (NMFS 1999). For actions that affect freshwater habitat, NOAA Fisheries defines the biological requirements of the species in terms of a concept called properly function condition (PFC). Proper functioning condition is the sustained presence of natural habitat forming processes in a watershed that are necessary for the long-term survival and recovery of salmon and steelhead through the full range of environmental variation. Natural habitat-forming processes include, but are not limited to, bedload transport, large woody debris recruitment, and riparian vegetation succession, and most of these processes are driven by water. PFC constitutes the habitat component of a species' biological requirements.

Whether species' biological requirements are expressed in terms of population variables or habitat components, a strong causal link exists between the two. Actions that affect habitat have the potential to effect population abundance, productivity and diversity, and these impacts can be particularly acute when populations are at low levels. The importance of this relationship is highlighted by the fact that freshwater habitat degradation is identified as a factor for decline in every salmon listing on the West Coast. With respect to the analysis of Federal actions on listed species, by analyzing the effects of a given action on the habitat portion of a species biological requirements, NOAA Fisheries is able to gauge how that action will affect the population variables that constitute the rest of a species' biological requirements, and ultimately, how the action will affect the species' current and future health.

2.1.4 Environmental Baseline

Regulations implementing section 7 of the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, state, or private actions and other human activities in the action area. The environmental baseline also includes the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of state and private actions that are contemporaneous with the consultation in progress. The action area is defined in 50 CFR 402.02 to mean 'all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.'

For the purposes of this consultation, the action area includes all waters within the Portland District's regulatory jurisdiction for activities described in this consultation throughout the State of Oregon and within the range of listed salmon and steelhead. In addition, the action area includes all waters along the north shore of the Columbia River from McNary Dam to the river mouth within the Portland and Seattle District's regulatory jurisdiction for activities described in this consultation within the State of Washington. The action area may also extend upstream or downstream, based on the potential of the permitted activities to impair fish passage, riparian succession, the hydrologic cycle, the erosion, transportation and deposition of sediments, and other ecological processes related to the formation and maintenance of salmon habitats. Indirect effects may occur throughout the watershed where other activities depend on actions described in this Opinion for their justification or usefulness. Information on the environmental baseline within this area was presented in the June 14, 2002 Opinion, and has not changed appreciably since that time.

Under SLOPES, the Corps is required to provide an annual monitoring report. The report is intended to be a summary of project data and a description of program participation, the quality of supporting analyses, monitoring information, compensatory mitigation provided by permittees, trends in the environmental baseline, and recommendations to improve the effectiveness of the program. In reports submitted for 2001 and 2002, the Corps identified a total of 313 permits that have been issued using SLOPES (Table 1). The number of permits issued grew slightly in 2002, with streambank protection, stream and wetland restoration, and recreational boating facilities accounting for most of the increase.

The Corps tightened its tracking system for 2002, and was able to complete inspections on 58 projects authorized by July 1, 2002. Of those, 14 projects were complete, 14 had not started, the rest were partially complete. Although the Corps has not determined whether all of the required project-level monitoring reports were submitted, the quality of information provided in reports that were reviewed appears adequate to describe efforts made to comply with permit requirements.

If permits issued using SLOPES are arranged by geographic areas corresponding to recovery planning domains and the currently listed ESUs they contain, 56% were in the Willamette/ Lower Columbia area, 26% were in the Oregon Coast area, 11% were within the Interior Columbia, and 6% were within the Southern Oregon/Northern California Coasts area (Table 2).[12] Most projects were authorized for the Willamette Valley. This pattern reflects the higher level of economic activity that takes place in the Willamette/ Lower Columbia coastal geographic areas compared with the part of the much larger Interior Columbia area, home for the most endangered ESUs (*i.e.*, UCR chinook, UCR steelhead and SR sockeye).

Table 1. Number of Corps Permits Issued Within the Action Area by Activity Type

ACTIVITY	**2001 (n = 143)**[13]	**2002 (n = 170)**

[12] See, NOAA Fisheries, Northwest Salmon Recovery Planning, at http://research.nwfsc.noaa.gov/cbd/trt/index.html.

[13] In 2001, permit activity on the north shore of the Columbia River consisted of four minor discharge and excavation projects and an unknown number of restoration actions in 2001. Those actions are included in this total although the north shore was not part of the SLOPES action area until 2002 to provide a more complete baseline from which to measure permits that may be covered in the future. In 2002, seven permits for actions on the north shore were issued under SLOPES for the following types of actions: one utility line, four recreational boating facilities, and two maintenance dredging.

Site Preparation for Construction of Buildings	0	3
Streambank Protection	19	29
Stream and Wetland Restoration	0	8
Water Control Structures	4	9
Road Construction, Repairs and Improvements	47	43
Utility Lines	18	18
Recreational Boating Facilities	24	32
Minor Discharge and Excavation	22	16
Maintenance Dredging	9	11
Return Water from Upland Disposal Sites	0	1

Table 2. Number of Corps Permits Issued Within the Action Area by Geographic Domain

GEOGRAPHIC DOMAIN	ESUs AFFECTED	2001 (n = 143)	2002 (n = 170)
Willamette/Lower Columbia	LCR chinook, UWR chinook, CR chum, LCR steelhead, UWR steelhead	92	96
Interior Columbia	SR fall-run chinook, SR spring/ summer-run chinook, UCR spring-run chinook, SR sockeye, UCR steelhead, SR Basin steelhead, MCR steelhead	21	19
Oregon Coast	OC coho	13	44
Southern Oregon/ Northern California Coasts	SONC coho	17	11

NOAA Fisheries concludes that not all of the biological requirements of the species within the action area are being met under current conditions, based on the best available information on the status of the affected species; information regarding population status, trends, and genetics; and the environmental baseline conditions within the action area. Significant improvement in habitat conditions over those currently available under the environmental baseline is needed to meet the biological requirements for survival and recovery of these species.

2.1.3 Effects of the Proposed Action

NOAA Fisheries' ESA regulations define 'effects of the action' as 'the direct and indirect effects of an action on the species or critical habitat with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline.' Direct effects are immediate effects of the project on the species or its habitat, and indirect effects are those caused by the proposed action and are later in time, but are still reasonably certain to occur (50 CFR 402.02).

Direct effects result from the agency action and can include effects of interrelated and interdependent actions. Future Federal actions that are not a direct effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated. Indirect effects are caused by the proposed action, are later in time, and are reasonably certain to occur (50 CFR 402.02). Indirect effects can occur outside of the area directly affected by the action. Indirect effects can include the effects of other Federal actions that have not undergone section 7 consultation, but will result from the action under consultation. These actions must be reasonably certain to occur, or be a logical extension of the proposed action.

<u>General Construction</u>. Most of the proposed actions require some degree of construction in and beside streams or other water bodies. The direct physical and chemical effects of the construction associated with the proposed actions begin with surveying, minor vegetation clearing, placement of stakes and flagging guides, and minor movements of machines and personnel over the action area. Subsequent construction of access roads, construction staging areas, and materials storage areas may affect more of the project area and clear vegetation that will allow rainfall to strike the bare land surface. Additional clearing and digging for site preparation and earthwork may remove more vegetation and topsoil, expose deeper soil layers, extend operations into the active channel, and reshape banks as necessary for successful revegetation. Different structures, each with a different set of effects that will be analyzed in subsequent sections, may be added to upland, riparian, freshwater, estuarine, in-water, or over-water locations. The final stage of general construction is site restoration and consists of actions necessary to restore ecological recovery mechanisms such as soil stability, energy and nutrient distribution, and vegetation succession.

To the extent that vegetation is providing habitat function, such as delivery of large wood, particulate organic matter or shade to a riparian area and stream, root strength for slope and bank stability, and sediment filtering and nutrient absorption from runoff, removal of that vegetation for construction will reduce or eliminate those habitat values (Darnell 1976, Spence *et al.* 1996). Denuded areas lose organic matter and dissolved minerals, such as nitrates and phosphates. Microclimate can become drier and warmer with corresponding increases in wind speed, and soil and water temperature. Water tables and spring flow can be reduced. Loose soil can temporarily accumulate in the construction area. In dry weather, this soil can be dispersed as dust. In wet weather, loose soil is transported to streams by erosion and runoff, particularly in steep areas. Erosion and runoff increase the supply of soil to lowland drainage areas and eventually to aquatic habitats where they increase water turbidity and sedimentation. This combination of erosion and mineral loss can reduce soil quality and site fertility in upland and riparian areas. Concurrent in-water work can compact or dislodge channel sediments, thus increasing turbidity and allowing currents to transport sediment downstream where it is eventually redeposited. Continued operations when the construction site is inundated can significantly increase the likelihood of severe erosion and contamination. The proposed action will avoid or minimize these effects with the following conservation measures:

- Exploration and construction actions, including release of construction discharge water, will not occur within 300 feet upstream of active spawning areas or areas with native submerged aquatic vegetation.
- Boundaries of clearing limits associated with site access and construction will be marked to avoid or minimize disturbance of riparian vegetation, wetlands and other sensitive sites.
- A pollution and erosion control plan will be prepared and carried out to prevent pollution and erosion related to construction operations. Erosion control elements of the plan will address materials storage sites, access roads, stream crossings, construction sites, borrow pit operations, haul roads, and inspection and replacement of erosion controls.
- A supply of emergency erosion control materials will be on hand, and temporary erosion controls will be installed and maintained in place until site restoration is complete.
- Existing roadways or travel paths will be used whenever possible.
- The number of temporary access roads will be minimized and roads will be designed to avoid adverse effects.
- Access ways may not be built mid-slope or on slopes greater than 30%.
- Stream crossings will provide for foreseeable risks such as flooding and associated bedload and debris to prevent a stream diversion if the crossing fails.
- Vehicles and machinery will cross riparian areas and streams at right angles whenever possible.
- Earthwork will be completed as quickly as possible.
- The site will be stabilized during any significant break in work.
- If listed fish are present, or the work area is within 300 feet of a spawning area, any in-water work area will be isolated from flowing waters.
- Project operations will cease under high flow conditions that may inundate the project area, except as necessary to avoid or minimize resource damage.

Use of heavy equipment during construction creates the opportunity for accidental spills of fuel, lubricants, hydraulic fluid and similar contaminants into the riparian zone or water where they can injure or kill aquatic organisms. Discharge of construction water used for vehicle washing, concrete washout, pumping for work area isolation, and other purposes can carry sediments and a variety of contaminants to the riparian area and stream. Similarly, use of treated wood in or over flowing water to build any type of structure at the construction site can introduce toxic compounds directly into the stream during cutting or abrasion, or by leaching (Poston, 2001). Once installed, pilings, docks, and other structures made of treated wood can leach contaminants into both fresh and saltwater environs. Polycyclic aromatic hydrocarbons (PAHs) are commonly released from creosote treated wood. PAHs may cause cancer, reproductive anomalies, immune dysfunction, growth and development impairment, and other impairments to exposed fish (Johnson 2000, Johnson *et al.* 1999, Stehr *et al.* 2000). Wood also is commonly treated with other chemicals such as ammoniacal copper zinc arsenate (ACZA) and chromated copper arsenate (CCA) (Poston 2001). Direct exposure to the contaminants occurs as salmon migrate past installations with treated wood or when the area is used for rearing, and indirect exposure occurs through ingestion of contaminated prey (Posten 2001). Leaching rates of contaminants from treated wood is highly variable (Posten 2001).

<u>Pile Driving</u>. Pilings made of concrete, plastic, steel, treated or untreated wood are used in many construction projects in riparian and aquatic areas. Vibratory or impact hammers are commonly used to drive piles into the substrate. An impact hammer is a heavy weight that is repeatedly dropped onto the top of the pile. A vibratory hammer uses a combination of a stationary, heavy weight and vibration, in the plane perpendicular to the long axis of the pile. The choice of hammer type depends on pile material, substrate type, and other factors. Impact hammers can drive piles into most substrates, including hardpan and glacial till, while vibratory hammers are limited to softer, unconsolidated substrates. However, over-water structures must often meet seismic stability criteria. This requires that the supporting piles be attached to, or driven into, a hard substrate and this often means that at least some impact driving is necessary. Further, the bearing capacity of a pile driven with vibration is unknown unless an impact hammer is used to ‘proof’ the pile by striking it pile several times to ensure it meets the designed bearing capacity. Temporary piles, fender piles, and some dolphin piles do not need to be seismically stable can be driven with a vibratory hammer only, providing the pile type and sediments are appropriate.

Piles are removed using a vibratory hammer, direct pull, clam shell grab, or cutting/breaking the pile below the mudline. Vibratory pile removal causes sediments to slough off at the mudline, resulting in some suspension of sediments and, possibly, contaminants. The direct pull method involves placing a choker around the pile and pulling upward with a crane or other equipment. When the piling is pulled from the substrate, sediments clinging to the piling slough off as it is raised through the water column, producing a plume of turbidity, contaminants, or both. The use of a clamshell may suspend additional sediment if it penetrates the substrate while grabbing the piling. If a piling breaks, the stub is often removed with a clam shell and crane. Sometimes, pilings are cut, broken, or driven below the mudline, and the buried section left in place. This may suspend a small amounts of sediment, providing the stub is left in place and little digging is required to reach the pile. Direct pull or use of a clamshell to remove broken piles is likely suspend more sediment and contaminants.

Turbidity generated from pile driving or removal is temporary and confined to the area close to the operation. NOAA Fisheries expects that some individual chinook salmon and steelhead, both adult and juvenile, may be harassed by turbidity plumes resulting from pile driving or removal. Indirect lethal take can occur if individual juvenile fish are preyed on when the leave the work area to avoid temporary turbidity plumes. The proposed requirements for completing the work during the preferred in-water work window will minimize the effects of turbidity on listed species.

Benthic invertebrates in shallow water habitats are key food sources for juvenile salmonids during their out migration. New pilings may reduce the substrate available to benthic aquatic organisms and, therefore, the food available for juvenile salmonids in the project area. NOAA Fisheries believes that some effect on salmon and steelhead productivity may occur due to suppression of benthic prey species. Most existing commercial dock structures have a high density of existing piles and are not likely to provide significant habitat for listed salmonids. Further, listed salmonids must migrate by such structures. This likely takes place in an area of diminished light intensity and deeper water along the outer margin of the structure, where they may have higher predation.

Pile driving often generates intense sound pressure waves that can injure or kill fish (Reyff 2003, Abbott and Bing-Sawyer 2002, Caltrans 2001, Longmuir and Lively 2001, Stotz and Colby 2001). The type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water, and the type and size of the pile-driving hammer all influence the sounds produced during pile driving. Sound pressure is positively correlated with the size of the pile because more energy is required to drive larger piles. Wood and concrete piles produce lower sound pressures than hollow steel piles of a similar size, and may be less harmful to fishes. Firmer substrates require more energy to drive piles and produce more intense sound pressures. Sound attenuates more rapidly with distance from the source in shallow than in deep water (Rogers and Cox 1988). Impact hammers produce intense, sharp spikes of sound that can easily reach levels that harm fishes, and the larger hammers produce more intense sounds. Vibratory hammers, on the other hand, produce sounds of lower intensity, with a rapid repetition rate.

Sound pressure levels (SPLs) greater than 150 decibels (dB) root mean square (RMS) produced when using an impact hammer to drive a pile have been shown to affect fish behavior and cause physical harm when peak SPLs exceed 180 dB (re: 1 microPascal). Surrounding the pile with a bubble curtain can attenuate the peak SPLs by approximately 20 dB and is equivalent to a 90% reduction in sound energy. However, a bubble curtain may not bring the peak and RMS SPLs below the established thresholds, and take may still occur. Without a bubble curtain, SPLs from driving 12 inch diameter steel pilings, measured at 10 m, will be approximately 205 dB_{peak} (Pentec 2003) and 185 dB_{rms}. With a bubble curtain, SPLs are approximately 185 dB_{peak} and 165 dBrms. Using the spherical spreading model to calculate attenuation of the pressure wave (TL = 50*log(R1/R2)), physical injury to sensitive species and life-history stages may occur up to 18 m from the pile driver, and behavioral effects up to 56 m. Studies on pile driving and underwater explosions suggest that, besides attenuating peak pressure, bubble curtains also reduce the impulse energy and, therefore, the potential for injury (Keevin 1998). Because sound pressure attenuates more rapidly in shallow water (Rogers and Cox 1988), it may have fewer deleterious effects there.

Fish respond differently to sounds produced by impact hammers than they do to sounds produced by vibratory hammers. Fish consistently avoid sounds like those of a vibratory hammer (Enger *et al.* 1993; Dolat 1997; Knudsen *et al.* 1997; Sand *et al.* 2000) and appear not to habituate to these sounds, even after repeated exposure (Dolat, 1997; Knudsen *et al.* 1997). On the other hand, fish may respond to the first few strikes of an impact hammer with a 'startle' response, but then the startle response wanes and some fish remain within the potentially-harmful area (Dolat 1997). Compared to impact hammers, vibratory hammers make sounds that have a longer duration (minutes vs. milliseconds) and have more energy in the lower frequencies (15-26 Hz vs. 100-800 Hz) (Würsig, *et al.* 2000; Carlson *et al.* 2001; Nedwell and Edwards 2002).

Air bubble systems can reduce the adverse effects of underwater sound pressure levels on fish. Whether confined inside a sleeve made of metal or fabric or unconfined, these systems have been shown to reduce underwater sound pressure (Würsig *et al.* 2000; Longmuir and Lively 2001; Christopherson and Wilson 2002; Reyff and Donovan 2003). Unconfined bubble curtains lower sound pressure by as much as 17 dB (85%) (Würsig *et al.* 2000, Longmuir and Lively 2001), while bubble curtains contained between two layers of fabric reduce sound pressure up to 22 dB (93%) (Christopherson and Wilson, 2002). However, an unconfined bubble curtain can be disrupted and rendered ineffective by currents greater than 1.15 miles per hour (Christopherson and Wilson, 2002). When using an unconfined air bubble system in areas of strong currents, it is essential that the pile be fully contained within the bubble curtain, and that the curtain have adequate air flow, and horizontal and vertical ring spacing around the pile.

Juvenile salmonids occur year round in waters covered by this Opinion. However, the potential for take resulting from pile driving and removal will be minimized by completing the work during preferred in water work windows, using a vibratory hammer where possible, and using sound attenuators where an impact hammer is necessary.

Besides the conservation measures listed above, the Corps has proposed the following conservation measures to further minimize or avoid these effects:

- Any new treated wood pilings will be installed following NOAA Fisheries' guidelines.
- The number and diameter of pilings will be minimized, as appropriate, without reducing structural integrity.
- No more than five single piles or one dolphin consisting of three to five piles may be replaced or added to an existing structure or marina per in-water construction period.
- Sound attenuation measures, including vibration dampeners, and unconfined or confined bubble curtains, will be used when impact driving steel pilings.
- Piles will be removed with a vibratory hammer.
- If a treated wood piling breaks during removal, either remove the stump by breaking or cutting 3 feet below the sediment surface or push the stump in to that depth, then cover it with a cap of clean substrate appropriate for the site.
- Holes left by each piling removed will be filled with clean, native sediments, whenever feasible.

- Whenever submerged large wood must be moved to install or remove a pile, the wood will be moved downstream where it will continue to function as part of the aquatic environment.

Heavy Equipment Use. Heavy equipment can cause soil compaction, thus reducing soil permeability and infiltration. Construction of pavement and other permanent soil coverings to build water-dependent structures (*e.g.*, bridges, boat ramps), roads linking those structures to the transportation system, and road upgrades can also reduce site permeability and infiltration. Permeability and infiltration are inversely related to the rate and volume of runoff. During and after wet weather, increased runoff can suspend and transport more sediment to receiving waters. This increases turbidity and stream fertility. Increased runoff also increases the frequency and duration of high stream flows and wetland inundation in construction areas. Higher stream flows increase stream energy that can scour stream bottoms and transport greater sediment loads farther downstream that would otherwise occur. Sediments in the water column reduce light penetration, increase water temperature, and modify water chemistry. Once deposited, sediments can alter the distribution and abundance of important instream habitats, such as pool and riffle areas. During dry weather, the physical effects of increased runoff appear as reduced ground water storage, lowered stream flows, and lowered wetland water levels. The effects of reduced soil permeability and infiltration are most significant in upland areas where runoff processes and the overall storm hydrograph are controlled mainly by groundwater recharge and subsurface flows. These effects are less significant in riparian areas, where saturated soils and high water tables are more common and runoff processes are dominated by direct precipitation and Horton overland flow (Dunn and Leopold 1978). Besides conservation measures listed above, the effects of heavy equipment operation will be further minimized or avoiding by the following conservation measures:

- Heavy equipment will be limited to that with the least adverse effects on the environment (*e.g*., minimally-sized, rubber-tired).
- New impervious surface for a water-dependent structure will be offset by an action like planting additional riparian trees and shrubs or restoration of near shore habitats.

Geotechnical Surveys and Drilling. Drilling activity associated with geotechnical surveys may produce effects in addition to those associated with general construction. Auger drilling produces on average 1.5 to 11.5 cubic meters of spoils that can be washed into nearby streams or wetlands if not stabilized or removed from the site. Erosion control berms and ditching sometimes used to manage runoff from a drill site where water- or rotary mud-drilling is underway may themselves may themselves cause erosion, sedimentation from drilling mud, or other temporary site disturbances. Moreover, runoff of untreated drilling fluids may pollute nearby streams and/or wetlands. Sometimes, drilling fluid can travel along a subsurface soil layer and exit in a stream or wetland. When this occurs, sediments are deposited in the stream. Occasional operating fluid leaks or spills from the drilling and other equipment also pose a contamination hazard to nearby streams or wetlands.

Excavating test pits eliminates vegetation in the excavated area and can cause vegetation compaction along wheel tracks and in excavated spoils placement areas. Typically, spoils do not erode into streams or wetlands since this material is placed back into the test pit once the investigation or sampling has been completed, usually within a two hour time period, and the disturbed area is stabilized by seeding and mulching. In cases where test pits are left open for longer time periods, sediments washed from the spoils piles could enter nearby streams or wetlands, especially during the winter rainy season. Effects from soils testing are similar to those described above for drilling operations.

Air rotary drilling produces dust, flying sand-sized rock particles, foaming additives, and fine water spray that could be deposited in streams or wetlands, if a collection device is not used. The distance that cuttings and liquids (*e.g.* water, foaming additives) can be ejected out of the boring depend on the size of the drilling equipment. Unrestrained, larger equipment will disperse particles up to 6.1 m, while smaller equipment will typically expel particles up to 3 m. Operating fluid leaks or spills from the drilling rig and other on-site equipment can be a hazard to nearby streams or wetlands.

During boring abandonment, when the boring is situated near streams or wetlands, excess grout may not be contained in the area of the boring, especially during rainy periods, and may cause pollution. Boring abandonment may not occur for months or even years after the drilling has been completed. If this occurs, vegetation may be affected when workers re-enter the site. These effects will be similar to those described above for site access. Sometimes, instruments must be drilled out. When this occurs, effects are similar to those described above for the particular drilling operation.

Excavating test pits eliminates vegetation in the excavated area and can cause vegetation compaction along wheel tracks and in excavated spoils placement areas. However, spoils do not typically erode into streams or wetlands because this material is placed back into the test pit once the investigation or sampling has been completed, usually within a two hour time period, and the disturbed area is stabilized by seeding and mulching. When test pits are left open longer, sediments washed from the spoils piles can enter nearby streams or wetlands, especially during the winter rainy season. Effects from soils testing are similar to those described above for drilling operations.

In addition to conservation measures applicable to construction in general, adverse effects specific to exploratory survey and drilling activities will be minimized or avoiding by following these steps:

- Hydraulic measurements that require access to the wetted channel will be done outside of the spawning season, or will have a biologist verify that there are no redds present at the site.
- Use of access roads will be avoided by using a crane to lower drilling equipment whenever feasible.

- Drilling pads will be designed to disturb the minimum area and to contain any spills that may occur, and will be constructed using the same conservation measures required for access road construction, including use of geotextile material and complete removal after the work is completed.
- Drilling will be completed in the dry, whenever feasible.
- Drilling pads and fluids near streams or other water bodies will be isolated using fluid recirculation, bio-bags, swale filtration, silt fencing, straw bails, sediment ponds, ditches or berms, as appropriate for site conditions.
- Any contaminated material collected at a drilling site will be stored securely until it can be safely removed for off-site disposal, including water produced during drilling or used for decontamination.
- All water produced during drilling will be contained until decontaminated.
- Spider hoes will be used when test pits must be excavated to eliminate the need for access road construction.

Site Restoration. The direct physical and chemical effects of post-construction site restoration included as part of the proposed actions are essentially the reverse of the construction activities that go before it. Bare earth is protected by seeding, planting woody shrubs and trees, and mulching. This immediately dissipates erosive energy associated with precipitation and increases soil infiltration. It also accelerates vegetative succession necessary to restore the delivery of large wood to the riparian area and stream, root strength necessary for slope and bank stability, leaf and other particulate organic matter input, sediment filtering and nutrient absorption from runoff, and shade. Microclimate will become cooler and more moist, and wind speed will decrease. In addition to conservation measures listed above, the Corps has proposed the following conservation measures to further minimize or avoid the adverse effects of site restoration, and to maximize the beneficial environmental effects:

- All temporary access roads will be obliterated when the project is completed, the soil will be stabilized and the site will be revegetated.
- Temporary roads in wet or flooded areas will be abandoned and restored by the end of the in-water work period.
- Any large wood, native vegetation, weed-free topsoil, and native channel material displaced by construction will be stockpiled for use during site restoration.
- When construction is finished, all streambanks, soils and vegetation will be cleaned up and restored as necessary to renew ecosystem processes that form and maintain productive fish habitats.
- No pesticide application will be allowed.
- Fencing will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
- An unavoidable adverse effect, such as construction of a new impervious surface for a water-dependent structure, will be offset by an action like planting additional riparian trees and shrubs or restoration of nearshore habitats.

Work Area Isolation. The most lethal biological effects of the proposed actions on individual listed salmon and steelhead will likely be caused by the isolation of in-water areas. Although work area isolation is itself a conservation measure intended to reduce the adverse effects of erosion and runoff on the population, any individual fish present in the work isolation area will be captured and released. Capturing and handling fish causes them stress though they typically recover fairly rapidly from the process and therefore the overall effects of the procedure are generally short-lived (NMFS 2002a). The primary contributing factors to stress and death from handling are differences in water temperatures (between the river and wherever the fish are held), dissolved oxygen conditions, the amount of time that fish are held out of the water, and physical trauma. Stress on salmonids increases rapidly from handling if the water temperature exceeds 18°C or dissolved oxygen is below saturation. Fish that are transferred to holding tanks can experience trauma if care is not taken in the transfer process, and fish can experience stress and injury from overcrowding in traps, if the traps are not emptied on a regular basis. Debris buildup at traps can also kill or injure fish if the traps are not monitored and cleared on a regular basis. These biological effects will be minimized or avoiding by the following conservation measures:

- Work within the active channel will be completed during preferred in-water work windows, when listed fish are least likely to be present in the action area, unless otherwise approved in writing by NOAA Fisheries.
- Fish passage will be provided for any adult or juvenile salmonid species that may be present in the project area during construction, and after construction for the life of the project.
- If listed fish are present, or the work area is within 300 feet of a spawning area, the in-water work area will be isolated.
- Any water intakes used for the project – including pumps used to dewater the work isolation area – will have a fish screen installed, operated and maintained according to NOAA Fisheries' fish screen criteria.
- Any listed fish that may be trapped within the isolated work area will be captured and released using methods approved by NOAA Fisheries, including supervision by a fishery biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish.

Direct Effects. The direct biological effects of construction included as part of the proposed action are primarily the result of physical and chemical changes in the environment caused by that construction. These effects are complex and vary in magnitude and severity between the individual organism, population, ESU and community scales. Construction actions may also have direct biological effects on individual salmon and steelhead by altering development, bioenergetics, growth, and behavior. Actions that increase flows can disturb gravel in salmon or steelhead redds and can also agitate or dislodge developing young and cause their damage or loss. Similarly, actions that reduce subsurface or surface flows, reduce shade, deposit silt in streams, or otherwise reduce the velocity, temperature, or oxygen concentration of surface water as it cycles through a redd can adversely affect the survival, timing, and size of emerging fry (Warren 1971). Coho salmon that survive the redd but emerge later and smaller than other fry also appear to be weaker, less dominant, and less capable of maintaining their position in the environment (Mason and Chapman 1965). Once adult salmon or steelhead arrive at a spawning area, their successful reproduction is dependent on the same environmental conditions that affect survival of embryos in the redd. Environmental conditions in estuarine areas with native submerged aquatic vegetation, in particular, are important to all species of salmon and to estuarine fishes.

Many environmental conditions can cause incremental differences in feeding, growth, movements, and survival of salmon and steelhead during the juvenile life stage. Construction actions that reduce the input of particulate organic matter to streams, add fine sediment to channels, or disturb shallow-water habitats, can adversely affect the ability of salmon and steelhead to obtain food necessary for growth and maintenance. Salmon and steelhead are generally able to avoid the adverse conditions created by construction if those conditions are limited to areas that are small or local compared to the total habitat area, and if the system can recover before the next disturbance. This means juvenile and adult salmon and steelhead will, to the maximum extent possible, readily move out of a construction area to obtain a more favorable position within their range of tolerance along a complex gradient of temperature, turbidity, flow, noise, contaminants, and other environmental features. The degree and effectiveness of the avoidance response varies with life stage, season and the frequency and duration of exposure to the unfavorable condition, and the ability of the individual to balance other behavioral needs for feeding, growth, migration, and territory. Chronic or unavoidable exposure heightens physiological stress thus increasing maintenance energy demands (Redding *et al.* 1987, Servizi and Martens 1991). This reduces the feeding and growth rates of juveniles and can interfere with juvenile migration, growth to maturity in estuaries, and adult migration. However, with due diligence for the full range of conservation measures outlined above, the threat is negligible that the environmental changes caused by events at any single construction site associated with the proposed action, or even any likely combination of such construction sites in proximity, could cause chronic or unavoidable exposure over a large habitat area sufficient to cause more than transitory direct affects to individual salmon or steelhead.

At the population level, the effects of the environment are understood to be the integrated response of individual organisms to environmental change. Thus, instantaneous measures of population characteristics, such as population abundance, population spatial structure and population diversity, are the sum of individual characteristics within a particular area, while measures of population change, such as population growth rate, are measured as the productivity of individuals over the entire life cycle (McElhany *et al.* 2000). Lethal take associated with work area isolation, if any, is expected to amount to no more than a few individual juveniles (see, Table 3). That is too few to influence population abundance. Similarly, small to intermediate reductions in juvenile population density in the action areas caused by individuals moving out of the construction area to avoid short-term physical and chemical effects of the proposed construction are expected to be transitory and are not expected alter juvenile survival rates.

Because adult salmon and steelhead are larger and more mobile than juveniles, it is unlikely that any will be killed during work area isolation although adults may move laterally or stop briefly during migration to avoid noise or other construction disturbances (Feist *et al.* 1996, Gregory 1988, Servizi and Martens 1991, Sigler 1988). However, with due diligence for the full range of conservation measures outlined above, it is unlikely that physical and chemical changes caused by construction events at any single construction site associated with the proposed action, or even any likely combination of such construction sites in proximity, will cause delays severe enough to reduce spawning success and alter population growth rate, or cause straying that might alter the spatial structure or genetic diversity of populations. Thus, it is unlikely that the direct biological effects of construction associated with the proposed action will affect the characteristics of salmon or steelhead populations.

At the ESU level, direct biological effects are synonymous with those at the population level or, more likely, are the integrated demographic response of one or more subpopulations (McElhany *et al.* 2000). As described above, it is unlikely that the direct biological effects of construction associated with the proposed action will affect the characteristics of salmon or steelhead populations, therefore it is also unlikely that salmon or steelhead will be affected at the ESU level.

Indirect Effects. Indirect effects that are reasonably certain to occur after the proposed construction is complete include human activity and ecological recovery in the construction area. The human activity will vary with the type and purpose of the structure or activity completed, and will be discussed below in sections analyzing specific types of actions. 'Ecological recovery' means the establishment or restoration of environmental conditions necessary for proper functioning condition in the construction area. Many proposed actions are likely to occur in areas where productive habitat functions and recovery mechanisms were absent or degraded before construction took place. These sites are only likely to achieve proper functioning condition if the preconstruction environment retains the ecological potential to function properly[14] (*e.g.*, residual productivity of riparian soils, channel conditions with balanced scour and fill processes). The prospect for ecological recovery will be further limited by ecological and social factors at the watershed and landscape scales, or site capacity. For example, ecological recovery of a project site surrounded by intensive land use and severe upstream disturbance is likely to be less stable and less resilient than the recovery of a site surrounded by wildlands where the headwaters are protected. To some extent, control of undesirable vegetation, limiting anthropogenic disturbance, and other proposed conservation measures described above will help to compensate for low residual ecological potential and accelerate recovery. However, they are unlikely to fully overcome severe site constraints imposed by low site capacity.

The time necessary for recovery of functional habitat attributes will vary by attribute. Recovery mechanisms such as soil stability, sediment filtering and nutrient absorption, and vegetation succession may recover quickly (months, years) after completion of the proposed action. Recovery of functions related to large wood and microclimate may require decades or longer.

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[14] 'Properly functioning,' 'properly functioning condition,' and 'properly functioning habitat condition' refers to the habitat component of a species' biological requirements and means the sustained presence of natural habitat-forming processes in a watershed necessary for the long-term survival of the species through the full range of environmental variation. See, NMFS (1999b).

Functions related to shading of the riparian area and stream, root strength for bank stabilization, and organic matter input may require intermediate lengths of time. Thus, ecological recovery that includes all important functional habitat attributes, within the limits of site potential and capability, may require many decades although substantial or full recovery of most attributes is likely to occur much sooner. This is well within the 100-year time frame used to evaluate the role of local environmental variation in the long-term survival of salmon and steelhead populations (McElhaney *et al.* 2000). Habitat areas associated with new pavement and other new permanent soil cover, if any, will not be part of this recovery trajectory. However, other riparian and in-water areas will be selected for concurrent habitat improvement using quantitative criteria developed for each project as necessary to offset any permanent habitat loss caused by construction.

The indirect biological effects of construction can be understood as the integrated response of individuals and populations of many, interrelated species at the community level. All populations are dependent on the physical and chemical conditions and resources at their locations, and together with these conditions and resources form ecosystems. A persistent change in the environmental conditions or resources of an ecosystem can lead to a change in the abundance of many, if not all, populations in the ecosystem and lead to development of a new community. Differences in riparian and instream habitat quality, including water chemistry, can alter trophic and competitive relationships in ways that support or weaken the populations of salmon and steelhead in relation to other more pollution tolerant species (Wentz *et al.* 1998; Williamson *et al.* 1998). However, with due diligence for the full range of proposed conservation measures outlined above, it is unlikely that physical and chemical changes due to construction activities associated with the proposed action will cause a persistent change in the conditions or resources available relative to the total habitat area. Thus, it is unlikely that the indirect biological effects of construction associated with the proposed action will affect the characteristics of individuals and populations at the biological community level.

<u>Site Preparation for Construction of Buildings and Related Features</u>. The proposed action includes site preparation for construction of buildings and related features outside of the riparian buffer area. Most direct and indirect effects of this type of site preparation are the same as those for general construction discussed above, and these site preparation actions will follow the conservation measures for general construction as applicable. However, the effects of this type of site preparation are likely to be less intense than those discussed above because all actions will occur outside of the riparian buffer area. An additional indirect effect of this activity, which includes site preparation for commercial buildings, houses, and parking lots, can be intentional or opportunistic human access to riparian or instream areas. Once in the riparian zone or instream area, people may walk or hike, thus trampling soils and channel materials, and disturbing vegetation in ways that can increase runoff and reduce plant growth. They may also start fires, dump trash, or otherwise adversely alter environmental conditions. However, with due diligence for the full range of conservation measures outlined above, including the requirement that fencing will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons, it is unlikely that environmental changes caused by these indirect effects at any single construction site associated with the proposed action, or that any

likely combination such construction sites in proximity, could cause chronic trampling or vegetation removal over a large habitat area sufficient to cause more than transitory indirect affects to salmon or steelhead.

Streambank Protection. The primary proposed streambank protection action is the use of large wood and vegetation to increase bank strength and resistance to erosion in an ecological approach to engineering streambank protection (Mitsch 1996; WDFW *et al.* 2003). Construction of 'hard' scour protection for specific public infrastructure and construction of barbs to redirect flow are also proposed. The proposed actions explicitly do not include any other type of structure built entirely of rock, concrete, steel or similar materials, other streamflow control structures, or any type of channel-spanning structure. Except as noted below, most direct and indirect effects of proposed streambank protection actions are the same as those for general construction discussed above, and streambank protection restoration actions will follow the conservation measures for general construction as applicable. The primary means of streambank protection proposed is the use of large wood and vegetation to increase resistance to bank erosion (bioengineering). This approach protects banks by using natural materials to increase erosion resistance and bank roughness to disrupt stream energy. Roots and other small and large pieces of vegetation are used to collect and bind bank sediments. This helps to avoid or minimize loss of riparian function associated with more traditional approaches to streambank protection that rely primarily on rock, cement, steel and other hard materials. Bioengineered bank treatments develop root systems that are flexible and regenerative, and respond more favorably to hydraulic disturbance than conventional hard alternatives. Besides conservation measures listed above, the effects of streambank protection will be further minimized or avoided by the following conservation measures:

- All streambank protection actions will provide the greatest degree of natural stream and floodplain function achievable through application of an integrated, ecological approach by requiring the selection of protection measures to be constrained by an analysis of the mechanisms and causes of streambank failure, reach conditions, and habitat impacts.
- Large wood will be included as an integral component of all streambank protection treatments. The wood will be intact, hard, and undecayed to partly decaying with untrimmed root wads to provide functional refugia habitat for fish.

The proposed use of 'hard' scour protection is limited to construction of a footing, facing, headwall, or other structure necessary to prevent scouring or downcutting of an existing culvert, utility line, or bridge support. Direct and indirect effects of these scour protection actions are similar to the effects of general construction discussed above, including production of new impervious surface, and will follow the conservation measures for general construction as applicable. Besides conservation measures listed above, the effects of scour protection will be further minimized or avoided by the following conservation measure:

- Fill of scour holes will be limited to that necessary to protect the integrity of the project and will not extend above the channel bed to avoid or minimize any effects on flow and channel forming processes.

Proposed streambank protection actions also include construction of a barb to redirect low flows believed to be causing certain kinds of bank erosion. A barb is a low elevation projection from a bank that is built primarily of stone and angled upstream to redirect flow away from the bank and control flow alignment. Most direct and indirect effects of constructing a barb are similar to those of general construction described above, and barb construction actions will follow the conservation measures for general construction as applicable. The direct effects of a barb also include redirection of instream flow away from the bank and toward the thalweg. This is believed to improve bank stability along smoothed channel or bends, especially when used in combination with bioengineering techniques (WDFW *et al.* 2000). This combination is most effective for reducing bank erosion along the outer edge of the channel migration zone in reaches where sedimentation and flows remain relatively constant over time. Barbs are designed to be overtopped by channel forming flows. This ensures that any direct effect they may have on channel forming processes or floodplain connectivity are avoided or minimized. Besides conservation measures listed above, the direct effects of barbs will be further minimized or avoiding by the following conservation measures:

- Woody riparian planting will be included as part of every streambank protection action.
- No part of the barb structure may exceed bank full elevation, including all rock buried in the bank key.
- The trench excavated for the bank key above bankfull elevation will be filled with soil and topped with native vegetation.
- The barb itself will incorporate large wood.
- Maximum barb length will not exceed 1/4 of the bankfull channel width.
- Rock will be individually placed without end dumping.
- If two or more barbs are built in a series, the barb farthest upstream will be placed within 150 feet or 2.5 bankfull channel widths, whichever is less, from the barb farthest downstream.

The indirect environmental effects of proposed bioengineered bank treatments are similar to those discussed above for general construction, particularly those related to ecological recovery. The indirect effects of scour protection for public infrastructures are similar, with the area occupied by the hard structure itself being analogous to an area of new impervious surface. However, this effect will be offset with the requirement of offset with additional planting of riparian trees and shrubs or restoration of nearshore habitats. The indirect effects of construction of a barb are also similar, but can also include the beneficial effects due to development of scour holes, deepened pools, and other low energy habitats useful as juvenile rearing areas down-gradient of the barb (USEPA 1998, Piper *et al.* 2001, cf., Rosgen, undated, describing hydrological problems caused by improperly designed barbs and other flow controls).

<u>Stream and Wetland Restoration</u>. The proposed stream and wetland restoration actions are limited to removal of trash, other artificial debris, sediment bars or terraces that block fish passage; removal of water control structures; and setback of levees, dikes and berms; and reshaping of streambanks as necessary to reestablish vegetation. Most direct and indirect effects

of stream and wetland restoration actions are the same as those for general construction discussed above, and stream and wetland restoration actions will follow the conservation measures for general construction as applicable. Further direct physical and chemical effects of trash and debris removal can include resuspension and deposition of sediment and contaminants contained in or buried under the trash and debris. Land uses practices such as agriculture and urban development have contributed increased sediment in streams. Sometimes this sediment can accumulate at the stream mouth, forming a bar or terrace. The bar or terrace can spread the streamflow into finely braided or sheet flow patterns, forming temporal or complete passage barriers to fish. While removal of sediment bars that block fish passage would normally be beneficial to anadromous fish in the long term, excessive amounts of removal may lead to ancillary effects to stream bed and banks that impair habitat formation and stream processes. Additional analysis of the project to evaluate these impacts are necessary. Therefore, limits on the amount and location of sediment bar and terrace removal are required.

Additional direct physical and chemical effects of removing water control structures and setting back levees, dikes and berms include an increase in effective floodplain and wetland area by restoration of seasonal flow. Additional biological effects of removing fish passage obstructions and removing or setting back water control structures can include an increase in the total habitat area available, and fish stranding. In addition to conservation measures listed above, the Corps has proposed the following conservation measure to further minimize or avoid these effects:

- Removal of sediment bars or terraces to improve fish passage is limited to areas within 50 feet of the mouth of a tributary, and to 25 cubic yards or less of sediment.
- Adequate precautions will be taken to prevent post-construction stranding of juvenile or adult fish.

Most indirect effects of removing water control structures and setting back levees, dikes and berms are similar to those discussed above for general construction. However, these actions can also alter environmental conditions in the project area such that it is converted from an upland biological community and ecosystem to a riparian, wetland or aquatic community and ecosystem. Many complex changes in soil, vegetation and hydrological conditions accompany this conversion and are beneficial for the restoration of proper functioning habitat conditions for salmon and steelhead (NRC 1992, Williams *et al.* 1996).

<u>Water Control Structures</u>. The proposed water control actions are limited to repair of existing water control structures and improvements to those structures as necessary to provide or improve fish passage. Because these preexisting structures have independent utility apart from fish passage, the only effects of the proposed actions are those related to repairs and modifications necessary for for fish passage. Therefore, most direct and indirect effects of these actions are similar to the effects of general construction discussed above, and will follow the conservation measures for general construction as applicable. Additional biological effects of providing or improving removing fish passage are an increase in the total available habitat area.

Road Construction, Repairs and Improvements. The proposed action for road construction, repairs and improvements does not include construction of a new road within the riparian buffer area, a new bridge pier or abutment below the bankfull elevation, a new bridge approach within the Federal Emergency Management Agency (FEMA) designated floodway that will require embankment fills that significantly impair floodplain function, or a baffled culvert or fishway. Most direct and indirect effects of the proposed road construction, repairs and improvements are the same as those for general construction discussed above, and these road actions will follow the conservation measures for general construction as applicable. However, the adverse effects of roads can be more severe and more intense than those of general construction because roads, bridges and their associated drainage systems, and traffic accidents, can cause accelerated runoff of sediment and contaminated water. Additional biological effects can include accelerating the introduction of alien plant and animal species that can make ecological recovery more uncertain (Gucinski *et al.* 2001). Besides general conservation measures for general construction, above, the Corps has proposed the following conservation measures for all road construction, repair and improvement actions:

- Permanent stream crossings will be designed in the following priority: Road realignments to avoid crossing the stream, streambed simulation, no-slope design culverts. If the crossing will occur near an active spawning area, only full span bridges or streambed simulation may be used.
- Fill width will be limited to the minimum necessary to complete the crossing, and will not reduce existing stream width.
- Maximum average water velocity in new culverts will not exceed 1-foot per second to provide for upstream passage of juvenile salmonids.
- Suitable grade controls will be included to prevent culvert failure caused by changes in stream elevation.
- Culverts will be cleaned by working from the top of the bank, unless culvert access using work area isolation would result in less habitat take. Cleaning will only remove the minimum amount of wood, sediment and other natural debris necessary to maintain culvert function without disturbing spawning gravel. All large wood recovered during cleaning will be placed downstream. All routine work will be done in the dry, using work area isolation if necessary.
- Road maintenance will comply with ODOT (1999) practices or the most current version of the Regional Road Maintenance Endangered Species Act Program Guidelines.

Utility Lines. Proposed utility line action consists of stream crossings for pipes, pipelines, cables, and wires. Most direct and indirect effects of utility line actions are similar to the effects of general construction discussed above, and will follow the conservation measures for general construction as applicable. Additional direct effects can include the production of spoils, contaminated lubricants, and other drilling waste produced by boring that can kill or injure fish if introduced into the water. Besides general conservation measures for construction, above, the Corps has proposed the following conservation measures for all utility line activities:

- Utility stream crossings will be perpendicular to the watercourse, or nearly so, and designed in the following priority: Aerial lines, including lines hung from existing bridges; directional drilling, boring and jacking; dry trenching or plowing.
- If directional drilling, boring or jacking is used, the drill, bore or jack hole will span the channel migration zone and any associated wetland, and pits and any associated waste will be completely isolated from surface waters. If drilling fluid or waste is visible in the water, all drilling activity will cease pending written approval from NOAA Fisheries to resume drilling.
- Trenching or plowing may only be used in a naturally (seasonally) dewatered stream or adjacent wetland where the work area can be completely isolated with using silt screens and without the need for any fish salvage. Trenches will be backfilled below the ordinary high water line with native material, then capped with clean gravel suitable for fish use in the project area, unless otherwise approved in writing by NOAA Fisheries.
- Large wood displaced by trenching or plowing will be returned to its original position, wherever feasible.
- Utility lines will not cause lateral migration, head cutting, general scour, or debris loading.

Construction of new utility lines has the potential to enable other interrelated activities, such as commercial and residential development, which may affect individuals of the ESA-listed species or their designated critical habitat through a variety of pathways (*e.g.*, alteration of floodplains, alteration of the volume or timing of water introduction into streams, water withdrawals). In the context of this programmatic consultation, it is not possible for NOAA Fisheries to anticipate all the possible circumstances where the Corps permitting of new utility line crossings might lead to such indirect effects, nor is NOAA Fisheries able to analyze the general effects of possible interrelated and interdependent activities. Accordingly, new utility line crossings that entail indirect effects to ESA-listed species or their designated critical habitats are not covered by this Opinion, and require individual consultation.

<u>Over-water and In-water Structures</u>. Over-water and in-water structures include recreational boating facilities and dock and wharf facilities operated by ports and other commercial entities. Recreational boating requires construction and maintenance of a variety of types and sizes of structures. Some are water dependent, and will be placed in riparian, nearshore and over-water areas. Others are 'related facilities' (*e.g.*, parking lots, picnic areas) that are not water dependent. For purposes of this consultation, actions proposed to support recreational boating facilities are construction of boat ramps, maintenance, repair and relocation of structures within an existing marina, structures in fleeting and anchorage areas, installation of small temporary floats, and repair of navigational aids. Commercial dock and wharf facilities also entail many different types and sizes of structures, often installed and operated over large areas. For purposes of this consultation, however, the proposed action includes the following work: (1) Replacement of existing pilings, fender piles, group pilings, walers, and fender pads; (2) installation of new mooring dolphins and structural pilings; (3) height extension of existing pilings; and
(4) recycling of large wood obstructions that limit the usefulness of dock and wharf facilities.

These proposed actions include these significant conservation measures:

- No new marinas, floating storage units, boat houses, houseboats are authorized.
- No new boat ramps, docks, piers, or other over-water facilities are authorized in an estuary or other saltwater areas, an exposed area requiring a breakwater, an area within 0.5 miles downstream of the mouth of a tributary, a shallow water area requiring significant excavation, or a deposition area likely to need routine maintenance dredging.
- No new over-water facilities wider than 6 feet are authorized, unless current velocity is greater than 0.7 feet per second during the low flow period or the structure is more than 50 feet from the shoreline and in water more than 20 feet deep.
- Modifications of existing marinas will be made within the existing footprint of the moorage, or in water more than 50 feet from the shoreline and more than 20 feet deep.
- All related facilities, such as parking lots and picnic areas, will be outside the riparian buffer area; and signs are required at public boating facilities to minimize the indirect adverse effects of boating by educating the public about pollution and its prevention.

Many direct and indirect effects of recreational boating activities are similar to those of general construction described above. Among those are construction of new impervious surfaces for a boat ramp or other water-dependent structure that will be offset by an action like planting additional riparian trees and shrubs or restoration of nearshore habitats. Other direct physical and chemical effects are unique to over-water structures. These are disruption of nearshore habitat, shading and ambient light changes, water flow pattern and energy disruption (Carrasquero 2001), although these effects have been avoided or minimized by conservation measures described above. Over-water structures can alter predator prey relationships by improving predator success (Hobson 1979, Bell 1991, Metcalfe *et al.* 1997), although the environmental conditions created by over-water structures that can increase predation on salmon can be avoided or minimized using project design criteria that reduce shaded area and avoid placement in shallow water and other low velocity locations (Carrasquero 2001).

Poor flushing in areas with marinas has been associated with increased water temperature, phytoplankton populations with nocturnal dissolved oxygen level declines resulting in organism hypoxia, and increased pollutant levels (Cardwell *et al.* 1980a). Water stagnation and fuel oil, paint and gasoline spills pose a serious hazard to juveniles in marinas (Heiser and Finn 1970). Elevated residues of heavy metals may be leaching from antifouling paint on vessels moored in marinas (Cardwell *et al.* 1980b). Chlorine-based cleaning solutions are sometimes discharged into marinas.

Residential docks and especially marinas are likely to have high levels of boating activity in their immediate vicinity, particularly next to floats. Specifically, docks may serve as a mooring area for boats or a staging platform for recreational boating activities. Boating activities may adversely affect listed salmonids and aquatic habitats directly through engine noise or prop movement, and the physical presence of a boat hull may disrupt or displace nearby fishes (Mueller 1980, Warrington 1999a).

The obvious indirect effect of recreational boating facilities is boating. Boating can result in discharges of many pollutants from boats and related facilities, and physical disruption to wetland, riparian and benthic communities and ecosystems through the actions of a boat hull, propeller, anchor, or wakes (USEPA 1993, Carrasquero 2001). These effects, too, have been avoided or minimized, to the extent possible using boating facility design criteria, by conservation measures described above. The intensity and magnitude of the remaining effects depend on the knowledge and discretion of boat operators as they pursue their boating activity. Boat traffic may also increase turbidity in shallow waters, uproot aquatic macrophytes in shallow waters, or cause pollution through exhaust, fuel spills, or release of petroleum lubricants (Warrington 1999b). Nordstrom (1989) says that boat wakes may also play a significant role in creating erosion in narrow creeks entering an estuary (areas extensively used by rearing juvenile salmonids). These boating impacts indirectly affect listed fish in many ways. Turbidity may injure or stress affected fishes (see above). The loss of aquatic macrophytes may expose salmonids to predation, decrease littoral productivity, or alter local species assemblages and trophic interactions. Despite a general lack of data specifically for salmonids, pollution from boats may cause short-term injury, physiological stress, decreased reproductive success, cancer, or death for fishes. Further, pollution may also affect fishes by affecting potential prey species or aquatic vegetation.

Boat docks, marinas, and associated structures in estuarine environments also may adversely affect anadromous fish. Salmon have evolved several life-history strategies for using estuaries (Williams et al. 1996). Five anadromous fish species (pink, chum, coho, and chinook salmon and sea-run cutthroat trout) are found in association with eelgrass meadows (Phillips 1984). Coho, yearling chinook, and sockeye salmon spend little time in the estuary; pink salmon traverse the estuary quickly; and chum and subyearling chinook salmon use the estuary quite extensively (Pearcy 1992, Fisher and Pearcy 1996). Pearcy (1992) says that chum salmon in Netarts Bay, Oregon makes extensive use of shallow marshes, sloughs, and tidal creeks in the upper reaches during high tides in the spring. During low tides they move into deep water channels. As the fish grew in size, they began to use the lower portions of the estuary.

The exact times when juvenile salmonids enter the estuary and how long they stay depend on numerous abiotic and biotic factors such as stream temperatures, fry size and condition, food resources, stream discharge and turbidity, tidal cycles, and photoperiod (Simenstad *et al.* 1982). Simenstad *et al.* (1997), in their monitoring studies of an 'engineered' slough, found that coho salmon use these areas as rearing habitat. In addition, sea-run cutthroat trout also spends substantial periods in the estuary (Giger 1972). Palmisano (1997), discussing factors for the decline of Umpqua River cutthroat trout, states that sea-run cutthroat make extensive use of estuaries, embayments, and sheltered shorelines, with some cutthroat residing in an estuary for up to 18 months. The National Research Council (1996) states, 'loss of estuarine and riverine habitat can potentially affect all salmon.'

Estuaries serve as essential rearing grounds and provide a transitional area for salmonids moving from fresh to salt water and vice-versa (Botkin *et al.* 1995). Estuaries also play a key role in regulating overall survival and abundance (Williams *et al.* 1996) and changes in estuarine food webs may constrain salmon production. Avoiding placement of boat docks and moorages in areas with aquatic vegetation will minimize impacts associated with these structures.

More subtle indirect effects are caused by the environmental changes caused by deployment of small floats, disintegration of floatation material, and use of boat structures as perches for piscivorous birds. Beyond conservation measures listed above, the effects of recreational boating facilities will be further minimized or avoided by the following conservation measures:

- Buoys or floats are prohibited in inactive anchorage and fleeting areas.
- All synthetic flotation material will be permanently encapsulated to prevent the breakup into small pieces and dispersal in water.
- Mooring buoys, small temporary floats, and floats for crab and shrimp traps will be installed more than 300 feet from native submerged aquatic vegetation, more than 50 feet from the shoreline, in water more than 20 feet deep, and otherwise as necessary to ensure that moored boats do not ground out or propeller wash the bottom.
- Small temporary floats will also be installed less than 7 days before a scheduled event, removed five days after a scheduled event is concluded, and not left in longer than 21 days total.
- All pilings, mooring buoys, and navigational aids (*e.g.*, channel markers) will be fitted with devices to prevent perching by piscivorus birds.
- Because the best way to minimize adverse effects caused by boating is to educate the public about pollution and its prevention, post a permanent sign that will be maintained at each permitted facility used by the general public describing measures to minimize boating impacts.
- In addition, all conservation measures for general construction apply as appropriate.

<u>Maintenance of Port, Industrial, and Marina Facilities</u>. This activity includes replacing existing pilings, fender piles, group pilings, walers, and fender pads. It also includes the installation of new mooring dolphins and structural pilings, height extension of existing pilings and the relocation of floats within an existing marina. NOAA Fisheries believes that with the proposed timing restrictions and the requirement for the use of treated wood meeting NOAA Fisheries guidelines, the activities of extending the height of existing pilings and the replacement of walers and fender pads are not likely to adversely affect ESA listed salmonids. Possible impacts to ESA-listed species and designated critical habitat from the remaining proposed activities are detailed below. They include increased turbidity, avoidance behavior risks, decreased food supplies, increased predation, decreased water quality, and loss of vegetative cover.

Piles can be removed using a variety of methods, including vibratory hammer, direct pull, clam shell grab, or cutting/breaking the pile below the mudline. Vibratory hammers can be used to remove all types of pile, including wood, concrete and steel. However, old, brittle piles may break under the vibrations and require use of another method. Beyond conservation measures listed above, the effects of pile removal will be further minimized or avoided by the following conservation measures:

- Pilings will be dislodged with a vibratory hammer.
- Once loose, the piling will be place onto the construction barge or other appropriate dry storage site.
- If a treated wood piling breaks during removal, the stump will either be removed by breaking or cutting 3 feet below the sediment surface or the stump will be pushed in to that depth, then covered with a cap of clean substrate appropriate for the site.
- Holes left by each piling will be filled with clean, native sediments, whenever feasible.

Shading from docks, piers, boat houses and moored boats may also reduce juvenile salmonid prey organism abundance and the complexity of the habitat by reducing aquatic vegetation and phytoplankton abundance (Kahler *et al.* 2000). Epibiotic assemblages on pier pilings at marinas subject to shading are markedly different than in surrounding areas, however the proposed requirements for shifting floats within the footprint of existing marinas should not change prey abundance.

Treated wood used for pilings and docks releases contaminants into both fresh and saltwater environs. PAHs are commonly released from creosote treated wood. PAHs may cause a variety of deleterious effects (cancer, reproductive anomalies, immune dysfunction, and growth and development impairment) to exposed fish (Johnson 2000, Johnson *et al.* 1999, Stehr *et al.* 2000). Wood also is commonly treated with other chemicals such as ammoniacal copper zinc arsenate (ACZA) and chromated copper arsenate (CCA) (Poston 2001). Direct exposure to the contaminants occurs as salmon migrate past installations with treated wood or when the area is used for rearing, and indirect exposure occurs through ingestion of other organisms that have been exposed (Posten 2001). Leaching rates of contaminants from treated wood is highly variable and dependent on many factors (Posten 2001). Consequently, Posten (2001) recommends that use of treated wood for each individual situation needs to be evaluated on its own merits and subject to an evaluation of the pertinent conditions at each site. The proposed requirements for the use of treated wood meeting NOAA Fisheries guidelines and capping of sediments where treated wood is removed should minimize potential impacts.

Poor flushing in marinas in Puget Sound resulted in increases in temperature; increased phytoplankton populations with nocturnal dissolved oxygen level declines resulting in organism hypoxia; and pollutant inputs (Cardwell *et al.* 1980a). Water stagnation and fuel oil, paint and gasoline spills pose a serious hazard to juveniles in marinas (Heiser and Finn 1970). Elevated residues of heavy metals may be leaching from anti-fouling paint on vessels moored in marinas (Cardwell *et al.* 1980b). Chlorine-based cleaning solutions are also discharged into marinas. An exchange of at least 30% of the water in the marina during a tidal change should minimize temperature increases and dissolved oxygen problems (Cardwell *et al.* 1980a). Ensuring that relocation of existing floats in a marina does not diminish water exchange rates should maintain current water quality levels.

Marinas, and associated structures in estuarine environments also may harm anadromous fish. Salmon have evolved several life-history strategies for using estuaries (Williams *et al.* 1996). Five anadromous fish species (pink, chum, coho, and chinook salmon and sea-run cutthroat trout) are found in association with eelgrass meadows (Phillips 1984). Coho, yearling chinook, and sockeye salmon spend little time in the estuary; pink salmon traverse through the estuary relatively quickly; and chum and subyearling chinook salmon use the estuary quite extensively (Pearcy 1992, Fisher and Pearcy 1996). Pearcy (1992) indicates that chum salmon in Netarts Bay, Oregon make extensive use of shallow marshes, sloughs, and tidal creeks in the upper reaches during high tides in the spring. During low tides they move into deep water channels. As the fish grew in size, they began to use the lower portions of the estuary.

The exact times when juvenile salmonids enter the estuary and how long they stay depend on numerous abiotic and biotic factors such as stream temperatures, fry size and condition, food resources, stream discharge and turbidity, tidal cycles, and photoperiod (Simenstad *et al.* 1982). Simenstad *et al.* (1997), in their monitoring studies of an 'engineered' slough, found that coho salmon use these areas as rearing habitat. In addition, sea-run cutthroat trout also spend substantial periods in the estuary (Giger 1972). Palmisano (1997), discussing factors for the decline of Umpqua River cutthroat trout, states that sea-run cutthroat make extensive use of estuaries, embayments, and sheltered shorelines, with some cutthroat residing in an estuary for as long as 18 months.

Estuaries serve as rearing grounds and provide a transitional area that is essential for salmonids moving from fresh to salt water and vice-versa (Botkin *et al.* 1995). They also play a key role in regulating overall survival and abundance such that changes in estuarine food webs may constrain salmon production (Williams *et al.* 1996). Avoiding placement of boat docks and moorages in areas with aquatic vegetation will minimize impacts associated with these structures.

<u>Minor Discharge and Excavation</u>. Minor discharge and excavation refers to maintenance and repairs of previously authorized structures, such as a wastewater outfall. The direct and indirect effects of these actions are the same as those for general construction discussed above, and these actions will follow the conservation measures for general construction as applicable. However, because these actions are limited in so limited in scope and typically involve very small areas, the direct and indirect effects of these actions on riparian and instream areas are likely to be less intense and severe than those caused by general construction.

<u>Maintenance Dredging</u>. The proposed maintenance dredging is to remove sediments necessary to maintain existing marinas, port terminals, and industrial docks and wharfs with the following restrictions: (1) The economic loading method for hopper dredging will not be used; (2) no dredging will take place in salmonid spawning habitats in tributaries or upstream or in the Columbia River above Bonneville Dam in backwater sloughs, silted-in lateral channels, alcoves, side channels, or other shallow-water areas less than 20 feet deep; and (3) flow lane spoil disposal will not be used.

The direct physical and chemical effects of dredging and spoil disposal activities can include modification of bottom topography and water circulation patterns, increased turbidity, a shift to coarser substrate within the dredged area, bottom siltation outside the dredged area with fine sediments, and return water from upland spoil disposal areas (Darnell 1976, NMFS 2002b). Modification of bottom topography and water circulation patterns are proportional to the dredged area in relation to the channel area. These effects are likely to be negligible for locations large enough to support the types of facilities affected by the proposed action.

In areas of coarse sand, like the lower Columbia River, the turbidity generated from the dredging process is likely to be very small and confined to the immediate dredging area. Similarly, the requirement that sediments be tested and approved for in-water disposal before dredging takes place will ensure that any opportunity for resuspension of contaminants as a result of maintenance dredging or return water from upland spoil disposal areas will be avoided or minimized. The effects of return flows from upland disposal areas are analyzed below. The direct biological effects of maintenance dredging can include entrainment of salmon and steelhead during dredging. However, no juvenile salmon or steelhead have been entrained during monitoring of normal dredging operations in the Columbia River (Larson and Moehl 1990).

The indirect biological effect of dredging can be disruption of benthic prey populations used by juvenile salmon and steelhead if repeated maintenance dredging in the same location exceeds the recovery rate of benthic food organisms or causes a permanent shift in substrate texture or other channel conditions either in the dredged area or downstream. Significant uncertainties regarding the nutritional state of migrating juvenile salmon and steelhead in relation to stability and productivity of freshwater foodwebs (Williams *et al.* 1966) and the small size of affected areas in relation to the available habitat area complicate evaluation of this effect. Nonetheless, the Corps has proposed to offset the possibility that maintenance dredging can delay or prevent recovery of benthic prey populations with additional plantings of riparian trees and shrubs or restoration of nearshore habitats.

Beyond conservation measures listed above, the effects of maintenance dredging will be further minimized or avoided by the following conservation measures:

- Sediment quality will be evaluated before dredging begins using the most recent version of NOAA Fisheries' approved criteria for evaluation of contaminated sediments; only sediments approved for in-water disposal by those criteria will be authorized for maintenance dredging.
- A hydraulic dredge intake must be kept at or just below the surface of the material being removed, but may be raised for brief periods of purging or flushing.
- Clamshell dredges must use a finishing type bucket with flaps, whenever feasible
- Dredge spoil will be placed in an approved upland area where it cannot reenter the water body and that is large enough to allow settling.

<u>Return Water From Upland Disposal Sites</u>. This proposed activity includes return water from upland, contained dredged material disposal sites discharged at 4 feet per second, or less, measured at the outfall or diffuser port. The direct physical and chemical effects of this activity are limited to small changes in the location and timing of flow. These changes are a function of

the volume of interstitial water contained in the dredged material, the distance between the dredge site and the outfall or diffuser port, and the time necessary for water in the spoils to reach the outfall or diffuser port. This action only applies to dredging activities permitted under this Opinion.

Synthesis of All Action Effects. The scope of activity allowed under each type of proposed action is narrowly proscribed, and is further limited by conservation measures tailored to avoid direct and indirect adverse effects of those actions on properly functioning habitat conditions. Due diligence for the scope of actions allowed and conservation measures required will probably limit direct lethal effects on listed fish to a few deaths associated with isolation of in-water work areas, an action necessary to avoid greater environmental harm. All other direct adverse effects will likely be transitory and within the ability of both juveniles and adults to avoid by bypassing or temporarily leaving the proposed action area. Such behavioral avoidance will probably be the only significant biological response of salmon and steelhead to the proposed actions. This is because action areas are likely to be widely distributed and small compared with the total habitat area; the intensity and severity of environmental effects within the action areas have been comprehensively minimized; and proper functioning habitat conditions are likely to recover within the action areas inside the time span used to evaluate local environmental variation in the long-term survival of salmon and steelhead populations. Completion of proposed restoration activities at a degraded site that retains the capability for proper functioning at the site, watershed and landscape scale, will likely result in an increase in the total area of properly functioning habitats available.

2.1.4 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as 'those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation.' Other activities within the watershed have the potential to impact fish and habitat within the action area. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes.

Non-Federal activities within the action area are expected to increase with a projected 34% increase in human population over the next 25 years in Oregon (ODAS 1999), and by a similar amount over the next 20 years in Washington (WDNR 2000). Thus, NOAA Fisheries assumes that future private and state actions will continue within the action area, but at increasingly higher levels as population density climbs.

2.1.5 Conclusion

After reviewing the best available scientific and commercial information available regarding the current status of the 14 ESUs considered in this consultation, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NOAA Fisheries' opinion that the action, as proposed, is not likely to jeopardize the continued existence of these species, and is not likely to destroy or adversely modify designated critical habitat.

Our conclusions are based on the following considerations: (1) SLOPES requires individual review of each project to ensure whether the proposed action will be covered by this Opinion, and that each applicable conservation measure (reiterated in this Opinion as reasonable and prudent measures and terms and conditions) is included as an enforceable condition of the permit document; (2) taken together, the conservation measures applied to each project will ensure that any short-term effects to water quality, habitat access, habitat elements, channel conditions and dynamics, flows, and watershed conditions will be brief, minor, and scheduled to occur at times that are least sensitive for the species' life-cycle; (3) the underlying requirement of an ecological design approach that protects and stimulates natural habitat forming processes is expected to result in authorization of many projects that will have beneficial long-term effects; and (4) the individual and combined effects of all actions permitted in this way are not expected to impair currently properly functioning habitats, appreciably reduce the functioning of already impaired habitats, or retard the long-term progress of impaired habitats toward proper functioning condition essential to the long-term survival and recovery at the population or ESU scale.

2.1.6 Conservation Recommendations

Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitats, or to develop additional information. NOAA Fisheries has no conservation recommendations to make at this time.

2.1.7 Reinitiation of Consultation

Consultation must be reinitiated if: (1) The amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; the action is modified in a way that causes an effect on listed species that was not previously considered; or (3) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16).

If the Corps fails to provide specified monitoring information by January 31, NOAA Fisheries will consider that a modification of the action that causes an effect on listed species not previously considered and causes the incidental take statement of the Opinion to expire. Consultation also must be reinitiated 3 years after the date this Opinion is signed. To reinitiate consultation, contact the Habitat Conservation Division (Oregon Habitat Branch) of NOAA Fisheries.

2.2 Incidental Take Statement

Section 9 and rules promulgated under section 4(d) of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. 'Harm' is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, and sheltering. 'Harass' is defined as actions that create the likelihood of injuring listed species by annoying it to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. 'Incidental take' is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

2.2.1 Amount or Extent of the Take

NOAA Fisheries anticipates that the proposed actions considered in this Opinion are reasonably likely to take some of the 14 ESA-listed species through habitat-related effects. Further, NOAA Fisheries expects those actions that require isolation of the in-water work area to result in an additional amount of nonlethal and lethal take.

Take associated with the habitat-related effects of actions such as these are largely unquantifiable and are not expected to be measurable as long-term effects on populations. Therefore, although NOAA Fisheries expects the habitat-related effects of these actions to cause some low level incidental take, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a specific amount of incidental take because of those habitat-related effects. In instances such as these, NOAA Fisheries designates the expected level of take as 'unquantifiable.'

NOAA Fisheries estimated the amount of take associated with those projects requiring isolation of the in-water work area using the following assumptions: (1) The geographic distribution and number of Corps regulatory actions covered by this Opinion each year will be similar to the distribution observed in 2002; (2) the Corps will also complete up to 50 operational actions each year; (3) approximately 10% of all actions will require isolation of the in-water work area; (4) each project requiring in-water work area isolation is likely to capture fewer than 100 juvenile salmonids; (5) of the ESA-listed fish to be captured and handled in this way, 98% or more are expected to survive with no long-term effects and 1-2% are expected to be injured or killed, including delayed mortality because of injury. Nonetheless, the more conservative estimate of 5% lethal take will be used here to allow for variations in experience and work conditions.

An estimate of the ratio of listed fish to non-listed fish in the Columbia Basin was obtained using NOAA Fisheries' data estimation of percentages of listed spring/summer and fall chinook, sockeye salmon and steelhead smolts arriving at various locations in the Columbia River basin in 2003[15], then increased several fold to provide a conservative estimate of take due to projects requiring isolation of the in-water work area each year (Table 3). The estimate for take of ESA-listed fish in the two Oregon Coast geographic areas was calculated in a similar way using ODFW preliminary estimates of coho spawner abundance for 2001.[16] Hatchery data for chum are from the Fish Passage Center, Portland, Oregon. Because many ESUs that these actions may affect are similar in appearance, assigning this take to groups below the species level is impossible. Even if monitoring proves the 5% mortality rate is accurate, isolation of in-water work area activities will not affect ESA-listed species at the population level. Capture and release of adult fish is not expected to occur as part of the proposed isolation of in-water work areas. Thus, NOAA Fisheries does not anticipate that any adult fish will be taken.

Table 3. Estimate of Nonlethal and Lethal Take Associated with Proposed Projects Requiring Isolation of an In-water Work Area

Geographic Area **Species**	**Life Stage**	**Total Catch**	**Nonlethal Take ESA-Listed Fish**	**Lethal Take ESA-Listed Fish**
Willamette/Lower Columbia				
chinook salmon	juvenile	1022	89	4
chum salmon	juvenile	354	11	1
steelhead	juvenile	24	1	0
Interior Columbia				
chinook salmon	juvenile	212	10	1
sockeye salmon	juvenile	2	0	0
steelhead	juvenile	89	2	0
Oregon Coast				
coho salmon	juvenile	700	686	34
S. Oregon/N. California Coasts				
coho salmon	juvenile	200	76	4

[15] Memorandum from John W. Ferguson, Northwest Fisheries Science Center, to Laurie Allen, NOAA Fisheries (March 20, 2003) (estimation of percentages of listed Pacific salmon and steelhead smolts arriving at various locations in the Columbia River Basin in 2003).

[16] Oregon Department of Fish and Wildlife, *Preliminary estimated coho spawner abundance -- 2002 spawning season* (May 19, 2003).

2.2.2 Reasonable and Prudent Measures

The measures described below are non-discretionary. They must be implemented so that they become binding conditions in order for the exemption in section 7(a)(2) to apply. The Corps has the continuing duty to regulate the activities covered in this incidental take statement. If the Corps fails to require the applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. NOAA Fisheries believes that activities carried out in a manner consistent with these reasonable and prudent measures, except those otherwise identified as exclusions, will not necessitate further site-specific consultation. Activities which do not comply with all relevant reasonable and prudent measures will require individual consultation.

NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to avoid or minimize the amount or extent of take of listed fish resulting from implementation of this Opinion. These reasonable and prudent measures would also avoid or minimize adverse effects to designated critical habitat.

The Corps shall:

1. Minimize incidental take from administration of the regulatory program for section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act of 1899 by ensuring effective administration of standard local operating procedures for endangered species (SLOPES).

2. Minimize incidental take from general construction by excluding non-qualifying permit actions from consideration under this Opinion and applying permit conditions or project specifications that avoid or minimize adverse effects to riparian and aquatic systems.

3. Minimize incidental take from site preparation for construction of buildings and related features by excluding non-qualifying permit actions from consideration under this Opinion and applying permit conditions or project specifications that avoid or minimize adverse effects to riparian and aquatic systems.

4. Minimize incidental take from streambank protection by excluding non-qualifying activities and applying permit conditions or project specifications that provide the greatest degree of natural floodplain and stream functions achievable through the use of an integrated, ecological approach.

5. Minimize incidental take from stream and wetland restoration by excluding non-qualifying permit actions from consideration under this Opinion and applying permit conditions or project specifications that avoid or minimize adverse effects to riparian and aquatic systems.

6. Minimize incidental take from repairs to water control structures by excluding non-qualifying permit actions from consideration under this Opinion and applying permit conditions or project specifications that avoid or minimize adverse effects to riparian and aquatic systems.

7. Minimize incidental take from road construction, repairs and improvements by excluding non-qualifying permit actions from consideration under this Opinion and applying permit conditions or project specifications that avoid or minimize adverse effects to riparian and aquatic systems.

8. Minimize incidental take from utility lines by excluding non-qualifying permit actions from consideration under this Opinion and applying permit conditions or project specifications that avoid or minimize adverse effects to riparian and aquatic systems.

9. Minimize incidental take from over-water and in-water structures by excluding non-qualifying permit actions from consideration under this Opinion and applying permit conditions or project specifications that avoid or minimize adverse effects to riparian and aquatic systems.

10. Minimize incidental take from minor discharge and excavation by excluding non-qualifying permit actions from consideration under this Opinion and applying permit conditions or project specifications that avoid or minimize adverse effects to riparian and aquatic systems.

11. Minimize incidental take by from maintenance dredging excluding non-qualifying permit actions from consideration under this Opinion and applying permit conditions or project specifications that avoid or minimize adverse effects to riparian and aquatic systems.

12. Minimize incidental take by from return water from upland disposal sites by excluding non-qualifying permit actions from consideration under this Opinion and applying permit conditions or project specifications that avoid or minimize adverse effects to riparian and aquatic systems.

13. Ensure completion of a comprehensive monitoring and reporting program to confirm this Opinion is meeting its objective of minimizing take from permitted activities.

2.2.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary and are applicable to more than one category of activity. Therefore, terms and conditions listed for one type of activity are also terms and conditions of any category in which they would also minimize take of listed species or their habitats.

1. To implement reasonable and prudent measure #1 (standard local operating procedures for endangered species; SLOPES), the Corps shall:

   a. Individual project review. Individually review each project to ensure that all direct and indirect adverse effects to listed salmon and their habitats are within the range of effects considered in this Opinion. For regulatory actions, each applicable term and condition from this Opinion will be included as an enforceable term of the permit document. For operational actions, each applicable term and conditions will be included as a final project specification.
   b. Full implementation required. Departure from full implementation of the terms and conditions of the following incidental take statement will result in the lapse of the protective coverage of section 7(o)(2) regarding 'take' of listed species and may lead NOAA Fisheries to a different conclusion as to the effects of the continuing action, including findings that specific projects will jeopardize listed species.
   c. Confirmation of fish presence. Contact a fish biologist from the NOAA Fisheries, ODFW or WDFW, as appropriate for the action area, if necessary to confirm that a project is within the present or historic range of a listed species or a designated critical habitat.
   d. Project access. Require landowners to provide reasonable access[17] to projects permitted under this Opinion for monitoring the use and effectiveness permit conditions.
   e. Salvage notice. Include the following notice with each permit issued, or in writing to each party that will supervise completion of the action.

      > NOTICE. If a sick, injured or dead specimen of a threatened or endangered species is found, the finder must notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at 360.418.4246. The finder must take care in handling of sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

   f. Compensatory mitigation projects. Ensure that each applicant or Corps project successfully completes site restoration and compensatory mitigation for long-term

[17] 'Reasonable access' means with prior notice to the applicant, the Corps and NOAA Fisheries may at reasonable times and in a safe manner, enter and inspect permitted projects to insure compliance with the reasonable and prudent measures, terms and conditions, in this Opinion.

adverse effects (if any) by including the following information as part of each permit issued under this Opinion.

    i. The name and address of the party(s) responsible for meeting each component of the site restoration and compensatory mitigation plan.
    ii. Performance standards for determining compliance.
    iii. Any other pertinent requirements such as financial assurances, real estate assurances, monitoring programs, and the provisions for short and long-term maintenance of the restoration or mitigation site.
    iv. A provision for Corps certification that all action necessary to carry out each component of the restoration or mitigation plan is completed, and that the performance standards are achieved.

g. <u>Reinitiation</u>. Reinitiate formal consultation on this Opinion within three years of the date of issuance. This term and condition is in addition to reinitiation requirements described in section 2.1.6 above.

h. <u>Failure to provide timely monitoring causes incidental take statement to expire</u>. If the Corps fails to provide specified monitoring information by January 31, NOAA Fisheries will consider that a modification of the action that causes an effect on listed species not previously considered and causes the incidental take statement of the Opinion to expire.

i. <u>Reinitiation contact</u>. To reinitiate consultation, contact the Habitat Conservation Division (Oregon State Office) of NOAA Fisheries.

2. To implement reasonable and prudent measure #2 (general conditions for surveying, exploration, construction, operation and maintenance), the Corps shall ensure that:

a. <u>Exclusions</u>. The following types of exploration and construction actions are not authorized, unless otherwise approved in writing by NOAA Fisheries.

    i. Exploration and construction actions, including release of construction discharge water, within 300 feet upstream of active spawning areas or areas with native submerged aquatic vegetation as determined by a preconstruction survey.
    ii. Exploration actions in estuaries that cannot be conducted from an existing bridge, dock, or wharf.

b. <u>Hydraulic surveys</u>. Hydraulic measurements that require access to the wetted channel will be done outside of the spawning season, or will have a fisheries biologist verify that there are no redds present at the site. If dye must be used, only non-toxic vegetable dyes is authorized; use of short pieces of plastic ribbon to determine flow patterns is not authorized.

c. <u>Minimum area</u>. Confine construction impacts to the minimum area necessary to complete the project.

d. Timing of in-water work. Work below the bankfull elevation[18] will be completed using the most recent ODFW or the Corps Seattle District preferred in-water work period, as appropriate for the project area, unless otherwise approved in writing by NOAA Fisheries.

e. Cessation of work. Cease project operations under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.

f. Fish screens. Have a fish screen installed, operated and maintained according to NOAA Fisheries' fish screen criteria[19] on each water intake used for project construction, including pumps used to isolate an in-water work area. Screens for water diversions or intakes that will be used for irrigation, municipal or industrial purposes, or any use besides project construction are not authorized.

g. Fish passage. Provide passage for any adult or juvenile salmonid species present in the project area during construction, unless otherwise approved in writing by NOAA Fisheries, and after construction for the life of the project. Upstream passage is not required during construction if it did not previously exist.

h. Pollution and Erosion Control Plan. Prepare and carry out a pollution and erosion control plan to prevent pollution caused by surveying or construction operations. The plan must be available for inspection on request by Corps or NOAA Fisheries.

  i. Plan Contents. The pollution and erosion control plan will contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.

    (1) The name and address of the party(s) responsible for accomplishment of the pollution and erosion control plan.

    (2) Practices to prevent erosion and sedimentation associated with access roads, stream crossings, drilling sites, construction sites, borrow pit operations, haul roads, equipment and material storage sites, fueling operations, staging areas, and roads being decommissioned.

    (3) Practices to confine, remove and dispose of excess concrete, cement, grout, and other mortars or bonding agents, including measures for washout facilities.

    (4) A description of any regulated or hazardous products or materials that will be used for the project, including procedures for inventory, storage, handling, and monitoring.

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[18] 'Bankfull elevation' means the bank height inundated by a 1.5 to 2-year average recurrence interval and may be estimated by morphological features such average bank height, scour lines and vegetation limits.

[19] National Marine Fisheries Service, *Juvenile Fish Screen Criteria* (revised February 16, 1995) and *Addendum: Juvenile Fish Screen Criteria for Pump Intakes* (May 9, 1996) (guidelines and criteria for migrant fish passage facilities, and new pump intakes and existing inadequate pump intake screens) (http://www.nwr.noaa.gov/1hydrop/hydroweb/ferc.htm).

(5) A spill containment and control plan with notification procedures, specific cleanup and disposal instructions for different products, quick response containment and cleanup measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

(6) Practices to prevent construction debris from dropping into any stream or water body, and to remove any material that does drop with a minimum disturbance to the streambed and water quality.

ii. Inspection of erosion controls. During construction, monitor instream turbidity and inspect all erosion controls daily during the rainy season and weekly during the dry season, or more often as necessary, to ensure the erosion controls are working adequately.[20]

(1) If monitoring or inspection shows that the erosion controls are ineffective, mobilize work crews immediately to make repairs, install replacements, or install additional controls as necessary.

(2) Remove sediment from erosion controls once it has reached 1/3 of the exposed height of the control.

i. Construction discharge water. Treat all discharge water created by construction (*e.g.*, concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) as follows.

i. Water quality. Design, build and maintain facilities to collect and treat all construction discharge water, including any contaminated water produced by drilling, using the best available technology applicable to site conditions. Provide treatment to remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present.

ii. Discharge velocity. If construction discharge water is released using an outfall or diffuser port, velocities may not exceed 4 feet per second, and the maximum size of any aperture may not exceed one inch.

iii. Pollutants. Do not allow pollutants including green concrete, contaminated water, silt, welding slag, sandblasting abrasive, or grout cured less than 24 hours to contact any wetland or the 2-year floodplain.

iv. Drilling discharge. All drilling equipment, drill recovery and recycling pits, and any waste or spoil produced, will be completely isolated to prevent drilling fluids or other wastes from entering the stream.

(1) All drilling fluids and waste will be completely recovered then recycled or disposed to prevent entry into flowing water.

(2) Drilling fluids will be recycled using a tank instead of drill recovery/recycling pits, whenever feasible.

[20] 'Working adequately' means that project activities do not increase ambient stream turbidity by more than 10% above background 100 feet below the discharge, when measured relative to a control point immediately upstream of the turbidity causing activity.

(3) When drilling is completed, attempts will be made to remove the remaining drilling fluid from the sleeve (**e.g.**, by pumping) to reduce turbidity when the sleeve is removed.

j. Piling installation. Install temporary and permanent pilings as follows.

i. Minimize the number and diameter of pilings, as appropriate, without reducing structural integrity.

ii. Repairs, upgrades, and replacement of existing pilings consistent with these terms and conditions are allowed.

iii. In addition to repairs, upgrades, and replacements of existing pilings, up to five single pilings or one dolphin consisting of three to five pilings may be added to an existing facility per in-water construction period.

iv. Drive each piling as follows to minimize the use of force and resulting sound pressure.

(1) Hollow steel pilings greater than 24 inches in diameter, and H-piles larger than designation HP24, are not authorized under this Opinion.

(2) When impact drivers will be used to install a pile, use the smallest driver and the minimum force necessary to complete the job. Use a drop hammer or a hydraulic impact hammer, whenever feasible and set the drop height to the minimum necessary to drive the piling.

(3) When using an impact hammer to drive or proof steel piles, one of the following sound attenuation devices will be used to reduce sound pressure levels by 20 decibels.

(a) Place a block of wood or other sound dampening material between the hammer and the piling being driven.

(b) If currents are 1.7 miles per hour or less, surround the piling being driven by an unconfined bubble curtain that will distribute small air bubbles around 100% of the piling perimeter for the full depth of the water column.[21]

(c) If currents greater than 1.7 miles per hour, surround the piling being driven by a confined bubble curtain (*e.g.*, a bubble ring surrounded by a fabric or metal sleeve) that will distribute air bubbles around 100% of the piling perimeter for the full depth of the water column.

(d) Other sound attenuation devices as approved in writing by NOAA Fisheries.

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[21] For guidance on how to deploy an effective, economical bubble curtain, see, Longmuir, C. and T. Lively, *Bubble Curtain Systems for Use During Marine Pile Driving*, Fraser River Pile and Dredge LTD, 1830 River Drive, New Westminster, British Columbia, V3M 2A8, Canada. Recommended components include a high volume air compressor that can supply more than 100 pounds per square inch at 150 cubic feet per minute to a distribution manifold with 1/16 inch diameter air release holes spaced every 3/4 inch along its length. An additional distribution manifold is needed for each 35 feet of water depth.

k. Piling removal. If a temporary or permanent piling will be removed, the following conditions apply.

   i. Dislodge the piling with a vibratory hammer.
   ii. Once loose, place the piling onto the construction barge or other appropriate dry storage site.
   iii. If a treated wood piling breaks during removal, either remove the stump by breaking or cutting 3 feet below the sediment surface or push the stump in to that depth, then cover it with a cap of clean substrate appropriate for the site.
   iv. Fill the holes left by each piling with clean, native sediments, whenever feasible.

l. Treated wood.

   i. Projects using treated wood[22] that may contact flowing water or that will be placed over water where it will be exposed to mechanical abrasion or where leachate may enter flowing water are not authorized, except for pilings installed following NOAA Fisheries' guidelines.[23] Treated wood pilings must incorporate design features to minimize abrasion of the treated wood from vessels, floats or other objects that may cause abrasion of the piling.
   ii. Visually inspect treated wood before final placement to detect and replace wood with surface residues and/or bleeding of preservative.
   iii. Projects that require removal of treated wood will use the following precautions.
      (1) Treated wood debris. Take care to ensure that no treated wood debris falls into the water. If treated wood debris does fall into the water, remove it immediately.
      (2) Disposal of treated wood debris. Dispose of all treated wood debris removed during a project, including treated wood pilings, at an upland facility approved for hazardous materials of this classification. Do not leave a treated wood piling in the water or stacked on the stream bank.

m. Preconstruction activity. Complete the following actions before significant[24] alteration of the project area.

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[22] 'Treated wood' means lumber, pilings, and other wood products preserved with alkaline copper quaternary (ACQ), ammoniacal copper arsenate (ACA), ammoniacal copper zinc arsenate (ACZA), copper naphthenate, chromated copper arsenate (CCA), pentachlorophenol, or creosote.

[23] Letter from Steve Morris, National Marine Fisheries Service, to W.B. Paynter, Portland District, U.S. Army Corps of Engineers (December 9, 1998) (transmitting a document titled *Position Document for the Use of Treated Wood in Areas within Oregon Occupied by Endangered Species Act Proposed and Listed Anadromous Fish Species, National Marine Fisheries Service, December 1998*).

[24] 'Significant' means an effect can be meaningfully measured, detected or evaluated.

i. Marking. Flag the boundaries of clearing limits associated with site access and construction to prevent ground disturbance of critical riparian vegetation, wetlands and other sensitive sites beyond the flagged boundary.

ii. Emergency erosion controls. Ensure that the following materials for emergency erosion control are onsite.

(1) A supply of sediment control materials (*e.g.*, silt fence, straw bales[25]).

(2) An oil-absorbing, floating boom whenever surface water is present.

iii. Temporary erosion controls. All temporary erosion controls will be in-place and appropriately installed downslope of project activity within the riparian area until site restoration is complete.

n. Temporary access roads and drilling pads. All temporary access roads and drilling pads will be constructed as follows.

i. Existing ways. Use existing roadways, travel paths, and drilling pads whenever possible, unless construction of a new way or drilling pad would result in less habitat take. When feasible, eliminate the need for an access road by walking a tracked drill or spider hoe to a survey site, or lower drilling equipment to a survey site using a crane.

ii. Steep slopes. Temporary roads or drilling pads built mid-slope or on slopes steeper than 30% are not authorized.

iii. Minimizing soil disturbance and compaction. Minimize soil disturbance and compaction whenever a new temporary road or drill pad is necessary within 150 feet[26] of a stream, water body or wetland by clearing vegetation to ground level and placing clean gravel over geotextile fabric, unless otherwise approved in writing by NOAA Fisheries.

iv. Temporary stream crossings.

(1) Minimize the number of temporary stream crossings.

(2) Design temporary road crossings as follows.

(a) Survey and map any potential spawning habitat within 300 feet downstream of a proposed crossing.

(b) Do not place a stream crossing at known or suspected spawning areas, or within 300 feet upstream of such areas if spawning areas may be affected.

(c) Design the crossing to provide for foreseeable risks (*e.g.*, flooding and associated bedload and debris, to prevent the

[25] When available, certified weed-free straw or hay bales will be used to prevent introduction of noxious weeds.

[26] Distances from a stream or water body are measured horizontally from, and perpendicular to, the bankfull elevation, the edge of the channel migration zone, or the edge of any associated wetland, whichever is greater. 'Channel migration zone' means the area defined by the lateral extent of likely movement along a stream reach as shown by evidence of active stream channel movement over the past 100 years (e.g., alluvial fans or floodplains formed where the channel gradient decreases, the valley abruptly widens, or at the confluence of larger streams).

diversion of streamflow out of the channel and down the road if the crossing fails).

(d) Vehicles and machinery will cross riparian areas and streams at right angles to the main channel wherever possible.

v. Obliteration. When the project is complete, obliterate all temporary access roads that will not be in footprint of a new bridge or other permanent structure, stabilize the soil, and revegetate the site. Abandon and restore temporary roads in wet or flooded areas by the end of the in-water work period.

o. Heavy Equipment. Restrict use of heavy equipment as follows:

i. Choice of equipment. When heavy equipment will be used, the equipment selected will have the least adverse effects on the environment (*e.g.*, minimally sized, low ground pressure equipment).

ii. Vehicle and material staging. Store construction materials, and fuel, operate, maintain and store vehicles as follows.

(1) To reduce the staging area and potential for contamination, ensure that only enough supplies and equipment to complete a specific job will be stored on-site.

(2) Complete vehicle staging, cleaning, maintenance, refueling, and fuel storage in a vehicle staging area placed 150 feet or more from any stream, water body or wetland, unless otherwise approved in writing by NOAA Fisheries.

(3) Inspect all vehicles operated within 150 feet of any stream, water body or wetland daily for fluid leaks before leaving the vehicle staging area. Repair any leaks detected in the vehicle staging area before the vehicle resumes operation. Document inspections in a record that is available for review on request by Corps or NOAA Fisheries.

(4) Before operations begin and as often as necessary during operation, steam clean all equipment that will be used below bankfull elevation until all visible external oil, grease, mud, and other visible contaminates are removed.

(5) Diaper all stationary power equipment (*e.g.*, generators, cranes, stationary drilling equipment) operated within 150 feet of any stream, waterbody or wetland to prevent leaks, unless suitable containment is provided to prevent potential spills from entering any stream or waterbody.

p. Site preparation. Conserve native materials for site restoration.

i. If possible, leave native materials where they are found.

ii. If materials are moved, damaged or destroyed, replace them with a functional equivalent during site restoration.

iii. Stockpile any large wood[27], native vegetation, weed-free topsoil, and native channel material displaced by construction for use during site restoration.

q. Isolation of in-water work area. If adult or juvenile fish are reasonably certain to be present, or if the work area is 300 feet upstream of spawning habitats, completely isolate the work area from the active flowing stream using inflatable bags, sandbags, sheet pilings, or similar materials, unless otherwise approved in writing by NOAA Fisheries.

r. Capture and release. Before and intermittently during pumping to isolate an in-water work area, attempt to capture and release fish from the isolated area using trapping, seining, electrofishing, or other methods as are prudent to minimize risk of injury.

i. The entire capture and release operation must be conducted or supervised by a fishery biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish.

ii. Do not use electrofishing if water temperatures exceed 18°C.

iii. If electrofishing equipment is used to capture fish, comply with NOAA Fisheries' electrofishing guidelines.[28]

iv. Handle ESA-listed fish with extreme care, keeping fish in water to the maximum extent possible during seining and transfer procedures to prevent the added stress of out-of-water handling.

v. Transport fish in aerated buckets or tanks.

vi. Release fish into a safe release site as quickly as possible, and as near as possible to capture sites.

vii. Do not transfer ESA-listed fish to anyone except NOAA Fisheries personnel, unless otherwise approved in writing by NOAA Fisheries.

viii. Obtain all other Federal, state, and local permits necessary to conduct the capture and release activity.

ix. Allow NOAA Fisheries or its designated representative to accompany the capture team during the capture and release activity, and to inspect the team's capture and release records and facilities.

s. Earthwork. Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible.

i. Drilling and sampling. If drilling, boring or jacking is used, the following conditions apply.

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[27] For purposes of this Opinion only, 'large wood' means a tree, log, or rootwad big enough to dissipate stream energy associated with high flows, capture bedload, stabilize streambanks, influence channel characteristics, and otherwise support aquatic habitat function, given the slope and bankfull channel width of the stream in which the wood occurs. See, Oregon Department of Forestry and Oregon Department of Fish and Wildlife, *A Guide to Placing Large Wood in Streams*, May 1995 (www.odf.state.or.us/FP/RefLibrary/LargeWoodPlacemntGuide5-95.doc).

[28] National Marine Fisheries Service, *Backpack Electrofishing Guidelines* (December 1998) (http://www.nwr.noaa.gov/1salmon/salmesa/pubs/electrog.pdf).

(1) Isolate drilling operations in wetted stream channels using a steel pile, sleeve or other appropriate isolation method to prevent drilling fluids from contacting water.

(2) If it is necessary to drill through a bridge deck, use containment measures to prevent drilling debris from entering the channel.

(3) If directional drilling is used, the drill, bore or jack hole will span the channel migration zone and any associated wetland.

(4) Sampling and directional drill recovery/recycling pits, and any associated waste or spoils will be completely isolated from surface waters, off-channel habitats and wetlands. All waste or spoils must be covered if precipitation is falling or imminent. All drilling fluids and waste will be recovered and recycled or disposed to prevent entry into flowing water.

(5) If a drill boring conductor breaks and drilling fluid or waste is visible in water or a wetland, all drilling activity will cease pending written approval from NOAA Fisheries to resume drilling.

ii. Site stabilization. Stabilize all disturbed areas, including obliteration of temporary roads, following any break in work unless construction will resume within four days.

iii. Source of materials. Obtain boulders, rock, woody materials and other natural construction materials used for the project outside the riparian area.

t. Stormwater management. Prepare and carry out a stormwater management plan for any project that will produce a new impervious surface or a land cover conversion that slows the entry of water into the soil. The plan must be available for inspection on request by Corps or NOAA Fisheries.

i. Plan contents. The goal is to avoid and minimize adverse effects due to the quantity and quality of stormwater runoff for the life of the project by maintaining or restoring natural runoff conditions. The plan will meet the following criteria and contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.

(1) A system of management practices and, if necessary, structural facilities, designed to complete the following functions.

(a) Minimize, disperse and infiltrate stormwater runoff onsite using sheet flow across permeable vegetated areas to the maximum extent possible without causing flooding, erosion impacts, or long-term adverse effects to groundwater.

(b) Pretreat stormwater from pollution generating surfaces, including bridge decks, before infiltration or discharge into a freshwater system, as necessary to minimize any nonpoint source pollutant (*e.g.*, debris, sediment, nutrients, petroleum hydrocarbons, metals) likely to be present in the volume of runoff predicted from a 6-month, 24-hour storm.[29]

(c) Ensure that the duration of post project discharge matches the pre-developed discharge rates from 50% of the 2-year peak flow up to the 50-year peak flow.

(2) For projects that require engineered facilities to meet stormwater requirements, use a continuous rainfall/runoff model, if available for the project area, to calculate stormwater facility water quality and flow control rates.

(3) Use permeable pavements for load-bearing surfaces, including multiple-use trails, to the maximum extent feasible based on soil, slope, and traffic conditions.

(4) Install structural facilities outside wetlands or the riparian buffer area[30] whenever feasible, otherwise, provide compensatory mitigation to offset any long-term adverse effects.

(5) Document completion of the following activities according to a regular schedule for the operation, inspection and maintenance of all structural facilities and conveyance systems, in a log available for inspection on request by the Corps and NOAA Fisheries.

(a) Inspect and clean each facility as necessary to ensure that the design capacity is not exceeded, heavy sediment discharges are prevented, and whether improvements in operation and maintenance are needed.

(b) Promptly repair any deterioration threatening the effectiveness of any facility.

(c) Post and maintain a warning sign on or next to any storm drain inlet that says, as appropriate for the receiving water, 'Dump No Waste - Drains to Ground Water, Streams, or Lakes.'

(d) Only dispose of sediment and liquid from any catch basin in an approved facility.

[29] A 6-month, 24-hour storm may be assumed to be 72% of the 2-year, 24-hour amount. See, Washington State Department of Ecology (2001), Appendix I-B-1.

[30] For purposes of this Opinion only, 'riparian buffer area' means land: (1) Within 150 feet of any natural water occupied by listed salmonids during any part of the year or designated as critical habitat; (2) within 100 feet of any natural water within 1/4 mile upstream of areas occupied by listed salmonids or designated as critical habitat and that is physically connected by an above-ground channel system such that water, sediment, or woody material delivered to such waters will eventually be delivered to water occupied by listed salmon or designated as critical habitat; and (3) within 50 feet of any natural water upstream of areas occupied by listed salmonids or designated as critical habitat and that is physically connected by an above-ground channel system such that water, sediment, or woody material delivered to such waters will eventually be delivered to water occupied by listed salmon or designated as critical habitat. 'Natural water' means all perennial or seasonal waters except water conveyance systems that are artificially constructed and actively maintained for irrigation.

ii. Runoffs/discharge into a freshwater system. When stormwater runoff will be discharged directly into fresh surface water or a wetland, or indirectly through a conveyance system, the following requirements apply.

(1) Maintain natural drainage patterns and, whenever possible, ensure that discharges from the project site occur at the natural location.

(2) Use a conveyance system comprised entirely of manufactured elements (*e.g.*, pipes, ditches, outfall protection) that extends to the ordinary high water line of the receiving water.

(3) Stabilize any erodible elements of this system as necessary to prevent erosion.

(4) Do not divert surface water from, or increase discharge to, an existing wetland if that will cause a significant adverse effect to wetland hydrology, soils or vegetation.

(5) The velocity of discharge water released from an outfall or diffuser port may not exceed 4 feet per second, and the maximum size of any aperture may not exceed one inch.

u. Site restoration. Prepare and carry out a site restoration plan as necessary to ensure that all streambanks, soils and vegetation disturbed by the project are cleaned up and restored as follows. Make the written plan available for inspection on request by the Corps or NOAA Fisheries.

i. General considerations.

(1) Restoration goal. The goal of site restoration is renewal of habitat access, water quality, production of habitat elements (*e.g.*, large woody debris), channel conditions, flows, watershed conditions and other ecosystem processes that form and maintain productive fish habitats.

(2) Streambank shaping. Restore damaged streambanks to a natural slope, pattern and profile suitable for establishment of permanent woody vegetation, unless precluded by pre-project conditions (*e.g.*, a natural rock wall).

(3) Revegetation. Replant each area requiring revegetation before the first April 15 following construction. Use a diverse assemblage of species native to the project area or region, including grasses, forbs, shrubs and trees. Noxious or invasive species may not be used.

(4) Pesticides. Take of ESA-listed species caused by any aspect of pesticide use is not included in the exemption to the ESA take prohibitions provided by this incidental take statement. Pesticide use must be evaluated in an individual consultation, although mechanical or other methods may be used to control weeds and unwanted vegetation.

(5) Fertilizer. Do not apply surface fertilizer within 50 feet of any stream channel.

(6) Fencing. Install fencing as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

ii. Plan contents. Include each of the following elements.

(1) Responsible party. The name and address of the party(s) responsible for meeting each component of the site restoration requirements, including providing and managing any financial assurances and monitoring necessary to ensure restoration success.

(2) Baseline information. This information may be obtained from existing sources (*e.g.*, land use plans, watershed analyses, subbasin plans), where available.

(a) A functional assessment of adverse effects, *i.e.*, the location, extent and function of the riparian and aquatic resources that will be adversely affected by construction and operation of the project.

(b) The location and extent of resources surrounding the restoration site, including historic and existing conditions.

(3) Goals and objectives. Restoration goals and objectives that describe the extent of site restoration necessary to offset adverse effects of the project, by aquatic resource type.

(4) Performance standards. Use these standards to help design the plan and to assess whether the restoration goal is met. While no single criterion is sufficient to measure success, the intent is that these features should be present within reasonable limits of natural and management variation.

(a) Bare soil spaces are small and well dispersed.

(b) Soil movement, such as active rills or gullies and soil deposition around plants or in small basins, is absent or slight and local.

(c) If areas with past erosion are present, they are completely stabilized and healed.

(d) Plant litter is well distributed and effective in protecting the soil with few or no litter dams present.

(e) Native woody and herbaceous vegetation, and germination microsites, are present and well distributed across the site.

(f) Vegetation structure is resulting in rooting throughout the available soil profile.

(g) Plants have normal, vigorous growth form, and a high probability of remaining vigorous, healthy and dominant over undesired competing vegetation.

(h) High impact conditions confined to small areas necessary access or other special management situations.

(i) Streambanks have less than 5% exposed soils with margins anchored by deeply rooted vegetation or coarse-grained alluvial debris.

(j) Few upland plants are in valley bottom locations, and a continuous corridor of shrubs and trees provide shade for the entire streambank.

(5) Work plan. Develop a work plan with sufficient detail to include a description of the following elements, as applicable.

(a) Boundaries for the restoration area.

(b) Restoration methods, timing, and sequence.

(c) Water supply source, if necessary.

(d) Woody native vegetation appropriate to the restoration site.[31] This must be a diverse assemblage of species that are native to the project area or region, including grasses, forbs, shrubs and trees. This may include allowances for natural regeneration from an existing seed bank or planting.

(e) A plan to control exotic invasive vegetation.

(f) Elevation(s) and slope(s) of the restoration area to ensure they conform with required elevation and hydrologic requirements of target plant species.

(g) Geomorphology and habitat features of stream or other open water.

(h) Site management and maintenance requirements.

(6) Five-year monitoring and maintenance plan.

(a) A schedule to visit the restoration site annually for 5 years or longer as necessary to confirm that the performance standards are achieved. Despite the initial 5-year planning period, site visits and monitoring will continue from year-to-year until the Corps certifies that site restoration performance standards have been met.

(b) During each visit, inspect for and correct any factors that may prevent attainment of performance standards (*e.g.*, low plant survival, invasive species, wildlife damage, drought).

(c) Keep a written record to document the date of each visit, site conditions and any corrective actions taken.

v. Long-term adverse effects. Prepare and carry out a compensatory mitigation plan as necessary to ensure the proposed action meets the goal of 'no net loss' aquatic functions by offsetting unavoidable long-term adverse effects to streams and other aquatic habitats. Make the plan available for inspection on request by Corps or NOAA Fisheries.

i. Actions of concern. The following actions require a Compensatory Mitigation Plan to offset long-term adverse effects.

(1) Riparian and aquatic habitats displaced by construction of structural stormwater facilities, new boat ramp, or scour protection

[31] Use references sites to select vegetation for the mitigation site whenever feasible. Historic reconstruction, vegetation models, or other ecologically-based methods may also be used as appropriate.

(*e.g.*, a footing facing, head wall, or other protection necessary to prevent scouring or downcutting of a culvert, water intake, utility line, or bridge support).

(2) Maintenance dredging in water closer than 50 feet from shore, or in waters less than 20 feet deep.[32]

(3) Other activities that prevent development of properly functioning condition of natural habitat processes.

ii. General considerations.

(1) Make mitigation plans compatible with adjacent land uses or, if necessary, use an upland buffer to separate mitigation areas from developed areas or agricultural lands.

(2) Base the level of required mitigation on a functional assessment of adverse effects of the proposed project, and functional replacement (*i.e.*, 'no net loss of function'), whenever feasible, or a minimum one-to-one linear foot or acreage replacement.

(3) Acceptable mitigation includes reestablishment or rehabilitation of natural or historic habitat functions when self-sustaining, natural processes are used to provide the functions. Actions that require construction of permanent structures, active maintenance, creation of habitat functions where they did not historically exist, or that simply preserve existing functions are not authorized, unless otherwise approved in writing by NOAA Fisheries.

(4) Whenever feasible, complete mitigation before, or concurrent with, project construction to reduce temporal loss of aquatic functions and simplify compliance.

(5) When project construction is authorized before mitigation is completed, the applicant will show that a mitigation project site has been secured and appropriate financial assurances in place.

(a) Complete all work necessary to carry out the mitigation plan no later than the first full growing season following the start of project construction, whenever feasible.

(b) If beginning the initial mitigation actions within that time is infeasible, then include other measures that mitigate for the consequences of temporal losses in the mitigation plan.

(6) Actions to complete a mitigation plan that require a Corps permit will also meet all applicable terms and conditions for this Opinion, or complete a separate consultation.

iii. Plan contents. Include all pertinent elements of a site restoration plan, outlined above, and the following elements.

(1) Consideration of the following factors during mitigation site selection and plan development.

[32] Depth in tidal waters is measured from mean lower low water (MLLW).

(a) Watershed considerations related to specific aquatic resource needs of the affected area.
(b) Existing technology and logistical concerns.

(2) A description of the legal means for protecting mitigation areas, and a copy of any legal instrument relied on to secure that protection.

3. To implement reasonable and prudent measure #3 (site preparation for construction of buildings and related features), the Corps shall ensure that site preparation for construction of a new building or related structure is not authorized inside the riparian buffer area.

4. To implement reasonable and prudent measure #4 (streambank protection), the Corps shall ensure that streambank protection actions are not authorized, except as follows, consistent with term and conditions for general construction:

   a. Streambank protection goal. The goal of streambank protection authorized by this Opinion is to avoid and minimize adverse affects to natural stream and floodplain function by limiting actions to those that are not expected to have long-term adverse effects on aquatic habitats. Whether these actions will also be adequate to meet other streambank protection objectives depends on the mechanisms of streambank failure operating at site- and reach-scale.[33]
   b. Choice of techniques. The following bank protection techniques are approved for use individually or in combination:
      i. Woody plantings and variations (*e.g.*, live stakes, brush layering, facines, brush mattresses).
      ii. Herbaceous cover, where analysis of available records (*e.g.*, historical accounts and photographs) shows that trees or shrubs did not exist on the site within historic times, primarily for use on small streams or adjacent wetlands.
      iii. Deformable soil reinforcement, consisting of soil layers or lifts strengthened with fabric and vegetation that are mobile ('deformable') at approximately two- to five-year recurrence flows.
      iv. Coir logs (long bundles of coconut fiber), straw bales and straw logs used individually or in stacks to trap sediment and provide growth medium for riparian plants.

[33] For guidance on how to evaluate streambank failure mechanisms, streambank protection measures presented here, and use of an ecological approach to management of eroding streambanks, see, e.g., Washington Department of Fish and Wildlife, Washington Department of Transportation, and Washington Department of Ecology, *Integrated Streambank Protection Guidelines*, various pagination (April 2003) (http://www.wa.gov/wdfw/hab/ahg/ispgdoc.htm), and Federal Interagency Stream Restoration Working *Group, Stream Corridor Restoration: Principles, Processes, and Practices*, various pagination (October, 1998) (http://www.usda.gov/stream_restoration/).

v. Bank reshaping and slope grading, when used to reduce a bank slope angle without changing the location of its toe, increase roughness and cross-section, and provide more favorable planting surfaces.

vi. Floodplain roughness, *e.g.*, floodplain tree and large woody debris rows, live siltation fences, brush traverses, brush rows and live brush sills; used to reduce the likelihood of avulsion in areas where natural floodplain roughness is poorly developed or has been removed.

vii. Floodplain flow spreaders, consisting of one or more rows of trees and accumulated debris used to spread flow across the floodplain.

viii. Flow-redirection structures known as barbs, vanes, or bendway weirs, when designed as follows, unless otherwise approved in writing by NOAA Fisheries.

(1) No part of the flow-redirection structure may exceed bank full elevation, including all rock buried in the bank key.

(2) Build the flow-redirection structure primarily of wood or otherwise incorporate large wood at a suitable elevation in an exposed portion of the structure or the bank key. Placing the large woody debris near streambanks in the depositional area between flow-direction structures to satisfy this requirement is not approved, unless those areas are likely to be greater than 1 meter in depth, sufficient for salmon rearing habitats.

(3) Fill the trench excavated for the bank key above bankfull elevation with soil and topped with native vegetation.

(4) The maximum flow-redirection structure length will not exceed 1/4 of the bankfull channel width.

(5) Place rock individually without end dumping.

(6) If two or more flow-redirection structures are built in a series, place the flow-redirection structure farthest upstream within 150 feet or 2.5 bankfull channel widths, from the flow-redirection structure farthest downstream.

(7) Include woody riparian planting as a project component.

c. <u>Use of large wood and rock</u>. Whenever possible, use large wood as an integral component of all streambank protection treatments.[34] Avoid or minimize the use of rock, stone and similar materials.

i. Large wood will be intact, hard, and undecayed to partly decaying with untrimmed root wads to provide functional refugia habitat for fish. Use of decayed or fragmented wood found laying on the ground or partially sunken in the ground is not acceptable.

[34] See, e,g, Washington Department of Fish and Wildlife, Washington Department of Transportation, and Washington Department of Ecology, *Integrated Streambank Protection Guidelines*, Appendix I:Anchoring and placement of large woody debris (April 2003) (http://www.wa.gov/wdfw/hab/ahg/ispgdoc.htm); Oregon Department of Forestry and Oregon Department of Fish and Wildlife, *A Guide to Placing Large Wood in Streams*, May 1995 (http://www.odf.state.or.us/FP/RefLibrary/RefsList.htm).

ii. Rock may be used instead of wood for the following purposes and structures. The rock will be class 350 metric, or larger, wherever feasible, but may not impair natural stream flows into or out of secondary channels or riparian wetlands. Whenever feasible, place topsoil over the rock and plant with woody vegetation.

(1) As ballast to anchor or stabilize large woody debris components of an approved bank treatment.

(2) To fill scour holes, as necessary to protect the integrity of the project, if the rock is limited to the depth of the scour hole and does not extend above the channel bed.

(3) To construct a footing, facing, head wall, or other protection necessary to prevent scouring or downcutting of, or fill slope erosion or failure at, an existing flow control structure (*e.g.*, a culvert, water intake), utility line, or bridge support.

(4) To construct a flow-redirection structure as described above.

5. To implement reasonable and prudent measure #5 (stream and wetland restoration), the Corps shall ensure that stream or wetland restoration projects[35] that will alter streambank or channel conditions are not authorized, except as follows and with adequate precautions to prevent post-construction stranding of juvenile or adult fish.

   a. Remove trash and other artificial debris dams that block fish passage.
   b. Remove sediment bars or terraces that block fish passage within 50 feet of a tributary mouth. No more than 25 cubic yards of sediment may be removed from within 25 feet of the mouth of the stream. Streambed grading could occur within 50 feet of the mouth of a stream.
   c. Remove levees, dikes, berms, weirs or other water control structures.
   d. Set back levees, dikes and berms.
   e. Reshape streambanks as necessary to reestablish vegetation.

6. To implement reasonable and prudent measure #6 (water control structures), the Corps shall:

   a. <u>Exclusions</u>. New or upgraded water control structures are not authorized, except as necessary to improve fish passage.
   b. <u>Water control structure repairs</u>. Repair of existing water control structures consistent with these terms and conditions is allowed.

7. To implement reasonable and prudent measure #7 (road construction, repairs and improvements), the Corps shall ensure that:

[35] 'Restoration project' means a habitat restoration activity whose primary purpose is to restore natural aquatic or riparian habitat process or conditions, which would not be undertake but for its restoration purpose.

a. Exclusions. The following types of projects are not authorized by this Opinion:
   i. A new, permanent road inside the riparian buffer area that is not a bridge approach.
   ii. A replacement bridge without full removal of the existing bridge, support structures and approach fill.
   iii. A new or replacement bridge pier or abutment below the bankfull elevation
   iv. A new bridge approach within the Federal Emergency Management Agency (FEMA)-designated floodway which will require embankment fills that significantly impair floodplain function.
   v. A baffled culvert or fishway.
b. Repairs, upgrades, and replacements. Existing bridges and culverts may be repaired, upgraded or replaced consistent with these terms and conditions, except that bridge replacements will be full span, *i.e.*, no bents, piers or other support structures below bankfull elevation.
c. New permanent stream crossings. Build permanent stream crossings as follows.
   i. Design.
      (1) Crossing types.[36] Design road crossings in the following priority. Explain why a particular design was chosen.
         (a) Nothing – road realignment to avoid crossing the stream.
         (b) Bridge – new bridges must span the stream to allow for long-term dynamic channel stability, *i.e.*, no bents, piers or other support structures below bankfull elevation..
         (c) Streambed simulation – bottomless arch, embedded culvert, or ford.
         (d) No-slope design culvert[37] – new culverts must have a 0% slope.
            (i) New culvert widths will meet or exceed bankfull width.
            (ii) To provide for upstream passage of juvenile salmonids, the maximum average water velocity[38] shall not exceed one foot per second.
            (iii) Include suitable grade controls to prevent culvert failure caused by changes in stream elevation.

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[36] For a discussion of crossing design types, see, National Marine Fisheries Service, Southwest Region, *Guidelines for Salmonid Passage at Stream Crossings* (September 2001) (http://swr.nmfs.noaa.gov/hcd/NMFSSCG.PDF) and Washington Department fo Fish and Wildlife, *Fish Passage Design at Road Culverts: A Design Manual for Fish Passage at Road Crossings* (March 3, 1999) (http://www.wa.gov/wdfw/hab/engineer/cm/toc.htm).

[37] 'No-slope design culvert' means a culvert that is sufficiently large and installed flat to allow the natural movement of bedload to form a stable bed inside the culvert.

[38] 'Maximum average water velocity' means the average of water velocity within the barrel of the culvert calculated using the 10% annual exceedance of the daily average flow.

(2) If the crossing will occur near an active spawning area, only a full span bridge or streambed simulation may be used.

(3) Limit fill width to the minimum necessary to complete the crossing. Do not reduce existing stream width.

ii. Culvert maintenance. Clean culverts by working from the top of the bank, unless culvert access using work area isolation would result in less habitat disturbance. Remove only the minimum amount of wood, sediment and other natural debris necessary to maintain culvert function without disturbing spawning gravel.

(1) Place all large wood, cobbles and gravels recovered during cleaning downstream of the culvert.

(2) Do all routine work in the dry, using work area isolation if necessary.

d. Road maintenance. Road maintenance must comply with ODOT (1999) practices or the most current version of the Regional Road Maintenance Endangered Species Act Program Guidelines.[39]

8. To implement reasonable and prudent measure #8 (utility lines), the Corps shall ensure that:

a. Exclusion. Construction or upgrading of a gas, sewer or water line to support a new or expanded service area for which effects, including indirect effects from interrelated or interdependent activities, have not been analyzed in this Opinion is not authorized by this Opinion.

b. Repairs, upgrades, and replacements. Repairs, upgrades, and replacements of existing utility lines consistent with these terms and conditions are allowed.

c. Utility stream crossings. Build utility stream crossings as follows.

i. Alignments will be perpendicular to the watercourse, or nearly so.

ii. Design utility line crossings in the following priority.

(1) Aerial lines, including lines hung from existing bridges

(2) Directional drilling, boring and jacking

(3) Trenching – this method may only be used in a naturally (seasonally) dewatered stream or adjacent wetland where the work area can be completely isolated with using silt screens and without the need for any fish salvage.

iii. Trenching. If trenching or plowing are used, the following will apply.

(1) Any trenching or plowing must occur in the dry.

[39] Oregon Department of Transportation, *Routine Road Maintenance: Water Quality and Habitat Guide, Best Management Practices*, 21 pp. + appendices (July 1999) (providing guidance on routine road maintenance activity only) (http://www.odot.state.or.us/eshtm/images/4dman.pdf) or, see, NMFS, *Regional Road Maintenance Endangered Species Act Program Guidelines* (March 2002) (http://www.metrokc.gov/roadcon/bmp/pdfguide.htm)

(2) Trenches must be backfilled below the ordinary high water line with native material, then capped with clean gravel suitable for fish use in the project area, unless otherwise approved in writing by NOAA Fisheries.

(3) Large wood displaced by trenching or plowing must be returned to its original position, wherever feasible.

d. Erosion. Utility lines will be prevented from causing lateral migration, head cutting, general scour, or debris loading.

e. Pits and spoils. Place all pits and other excavations associated with installation where they will not cause damage to the streambed or stream banks, and prevent wastewater or spoil material from entering the water.

9. To implement reasonable and prudent measure #9 (over-water and in-water structures), the Corps shall ensure that:

a. Exclusions. The following types of over-water and in-water structures are not authorized.

i. New marinas, floating storage units, boat houses, or houseboats

ii. New boat ramps, docks, piers, or other over-water facilities in the following areas

(1) An estuary or other saltwater area[40]

(2) An exposed area requiring a breakwater, jetty or groin

(3) Less than 0.5 miles downstream of the mouth of a tributary that supports spawning

(4) A shallow water area requiring significant excavation

(5) A deposition area likely to need routine maintenance dredging (*e.g.*, alcoves, backwater sloughs, side channels, other shallow-water areas)

(6) A shallow water area where a floating dock is likely to ground out or where moored boats will prop wash the bottom.

iii. Docks, piers, walkways or other over-water facilities wider than 6 feet, unless one of the following conditions is met.

(1) Current velocity is greater than 0.7 feet per second during the low flow period (April 1 through September 31).

(2) The over-water structure consists of grating with no ungrated area more than 4 feet wide.

(3) The over-water structure is more than 50 feet from the shoreline and in water more than 20 feet deep, measured from mean lower low water in the Columbia River in areas downstream of Jim Crow Sands (river mile 27) and in estuarine areas with mean annual

[40] 'Estuary or other saltwater area' means an area with maximum intrusion of more than 0.5 ppt measured at depth. For purposes of this Opinion only, the estuary or saltwater area of the Columbia River will be defined as that area downstream of Jim Crow Sands (river mile 27).

salinity greater than 0.5 parts per thousand and measured from ordinary high water in all other areas.

iv. Buoys or floats in inactive anchorage and fleeting areas.

v. Related facilities that are not water dependent (*e.g.*, parking lots, picnic areas, trails, toilets) inside the riparian buffer area.

vi. Asphalt boat ramps.

vii. Structures in areas with insufficient water velocities to dissipate fuels and pollutants from vessels.

b. <u>Repairs, upgrades and replacement</u>. Repairs, upgrades, and replacement of existing over-water and in-water structures consistent with these term and conditions are allowed.

c. <u>Modification of marinas</u>. Make modifications of existing marinas within the existing footprint of the moorage, or in water more than 50 feet from the shoreline and more than 20 feet deep, measured from mean lower low water in the Columbia River in areas downstream of Jim Crow Sands (river mile 27) and in estuarine areas with mean annual salinity greater than 0.5 parts per thousand and measured from ordinary high water in all other areas. Existing structures may not be moved into areas that support aquatic vegetation, or areas where boat operations may damage aquatic vegetation.

d. <u>General</u>. Add the following general conditions, as applicable, to permits for over-water and in-water structures.

i. <u>Piscivorus bird deterrence</u>. Fit all pilings, mooring buoys, and navigational aids (*e.g.*, channel markers) with devices to prevent perching by piscivorus birds.

ii. <u>Removal of large wood debris obstructions</u>. When floating or submerged large wood debris must be moved to allow the reasonable use of an over-water or in-water facility, ensure that the wood is returned to the water downstream where it will continue to provide aquatic habitat function.

iii. <u>Replacement of roofs and wall for covered moorages and boat houses</u>. Any replacement roofs and walls for covered moorages and boat houses are made of translucent materials.

iv. <u>Flotation</u>.

(1) Permanently encapsulate all synthetic flotation material to prevent breakup into small pieces and dispersal in water.

(2) Install mooring buoys, small temporary floats, and fish and wildlife harvesting devices (*e.g.*, crab and shrimp traps) as follows.

(a) More than 300 feet from native submerged aquatic vegetation

(b) More than 50 feet from the shoreline

(c) In water more than 20 feet deep, measured from mean lower low water in the Columbia River in areas downstream of Jim Crow Sands (river mile 27) and in estuarine areas with mean annual salinity greater than 0.5

parts per thousand and measured from ordinary high water in all other areas.

(3) Install mooring buoys as necessary to ensure that moored boats do not ground out or prop wash the bottom.

(4) Install small temporary floats less than 7 days before a scheduled event, remove them five days after a scheduled event is concluded, and do not leave them in place longer than 21 days total.

v. Educational Signs. Because the best way to minimize adverse effects caused by boating is to educate the public about pollution and its prevention, as part of any Corps permit for the facility, post the following information on a permanent sign that will be maintained at each permitted facility used by the public (such as marinas, public boat ramps, *etc.*).

(1) A description of the ESA-listed salmonids which are or may be present in the project area.

(2) Notice that the adults and juveniles of these species, and their habitats, are be protected so that they can successfully migrate, spawn, rear, and complete other behaviors necessary for their recovery.

(3) Lack of necessary habitat conditions may result in a variety of adverse effects including direct mortality, migration delay, reduced spawning, loss of food sources, reduced growth, reduced populations and decreased productivity.

(4) Therefore, all users of the facility are encouraged or required to:

(a) Follow procedures and rules governing use of sewage pump-out facilities.

(b) Minimize the fuel and oil released into surface waters during fueling, and from bilges and gas tanks.

(c) Avoid cleaning boat hulls in the water to prevent the release of cleaner, paint and solvent.

(d) Practice sound fish cleaning and waste management, including proper disposal of fish waste.

(e) Dispose of all solid and liquid waste produced while boating in a proper facility away from surface waters.

10. To implement reasonable and prudent measure #10 (other minor discharges and excavations), the Corps shall ensure that the only minor discharge or excavation[41] projects authorized are for minor repair of a previously existing project.

11. To implement reasonable and prudent measure #11 (maintenance dredging), the Corps shall ensure that:

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[41] 'Minor discharges and excavations' means small structural fills, minor excavations or dredging for maintenance and minor repairs of previously authorized structures such as culverts and outfalls.

a. Exclusions.
  i. The economic loading method[42] of placing dredged material on a barge as part of a dredging operation is not allowed.
  ii. Dredging in the following places is not allowed.
    (1) Salmonid spawning habitat in tributaries or upstream of those habitats.
    (2) Any channel for a water intake that does not have a fish screen that is installed, operated and maintained according to NOAA Fisheries' fish screen criteria.[43]
    (3) The Columbia River, above Bonneville Dam, in backwater sloughs, silted-in lateral channels, alcoves, side channels, or other shallow-water areas less than 20 feet deep, measured from mean lower low water in the Columbia River in areas downstream of Jim Crow Sands (river mile 27) and in estuarine areas with mean annual salinity greater than 0.5 parts per thousand and measured from ordinary high water in all other areas.

b. Dredge Material Evaluation Framework. Evaluate sediment quality before dredging begins using the most recent version of NOAA Fisheries' approved criteria for evaluation of contaminated sediments.[44] Only sediments approved for in-water disposal using those criteria are authorized for maintenance dredging.

c. Dredge operation. Operate dredges as follows:
  i. Keep hydraulic dredge intakes at or just below the surface of the material being removed, although the intake may be raised for brief periods of purging or flushing.
  ii. Use clamshell dredges with a finishing type bucket with flaps, whenever feasible.

d. Spoil disposal. Place dredge spoil in an approved upland area where it cannot reenter the water body and that is large enough to allow settling, or an in-water disposal area approved by the Corps.

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[42] 'Economic loading' means pumping dredged material with a high water content into the containment area of a hopper dredge or barge, and allowing highly turbid water to overflow over the holding area so that more consolidated material may be collected in the dredge containment area. This process results in a large turbidity plume from the dredge and is often preferred by the contractor performing the dredging because it saves time and money by increasing loads.

[43] National Marine Fisheries Service, *Juvenile Fish Screen Criteria* (revised February 16, 1995) and *Addendum: Juvenile Fish Screen Criteria for Pump Intakes* (May 9, 1996) (guidelines and criteria for migrant fish passage facilities, and new pump intakes and existing inadequate pump intake screens) (http://www.nwr.noaa.gov/1hydrop/hydroweb/ferc.htm).

[44] See, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Oregon Department of Environmental Quality, Washington Department of Ecology, and Washington Department of Natural Resources, *Dredged Material Evaluation Framework: Lower Columbia River Management Area* (DMEF) (November 1998) (procedures to determine sediment quality for dredging activity) (http://www.nwp.usace.army.mil/ec/h/hr/Final/).

12. To implement reasonable and prudent measure #12 (return water from upland disposal sites), the Corps shall ensure that:

    a. This only applies to dredging actions permitted under this Opinion.
    b. Return flows do not exceed 4 feet per second at either the outfall or diffuser port, the maximum size of any aperture does not exceed one inch, and stream flows are not otherwise altered in a way that significantly impairs spawning, rearing, migration, feeding or other essential behaviors.
    c. Return flows will not increases ambient stream turbidity by more than 10% above background 100 feet below the discharge, when measured relative to a control point immediately upstream of the discharge.

13. To implement reasonable and prudent measure #13 (monitoring), the Corps shall:

    a. <u>Regulatory program implementation monitoring</u>. Ensure that each applicant submits a monitoring report to the Corps within 120 days of project completion describing the applicant's success meeting his or her permit conditions. Each project level monitoring report will include the following information.
        i. <u>Project identification</u>
            (1) Applicant name, permit number, and project name.
            (2) Type of activity.
            (3) Project location, including any compensatory mitigation site(s), by 5th field HUC and by latitude and longitude as determined from the appropriate USGS 7-minute quadrangle map.
            (4) Corps contact person.
            (5) Starting and ending dates for work completed.
        ii. <u>Photo documentation</u>. Photos of habitat conditions at the project and any compensation site(s), before, during, and after project completion.[45]
            (1) Include general views and close-ups showing details of the project and project area, including pre and post construction.
            (2) Label each photo with date, time, project name, photographer's name, and a comment about the subject.
        iii. <u>Other data</u>. Additional project-specific data, as appropriate for individual projects.
            (1) <u>Work cessation</u>. Dates work ceased due to high flows, if any.
            (2) <u>Fish screen</u>. Evidence of compliance with NOAA Fisheries' fish screen criteria.
            (3) <u>Pollution control</u>. A summary of pollution and erosion control inspections, including any erosion control failure, contaminant release, and correction effort.

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[45] Relevant habitat conditions may include characteristics of channels, eroding and stable streambanks in the project area, riparian vegetation, water quality, flows at base, bankfull and over-bankfull stages, and other visually discernable environmental conditions at the project area, and upstream and downstream of the project.

(4) Drilling. A description of the drilling technology used, required access roads, and methods used to isolate all drilling operations and fluids from flowing water.

(5) Pilings.
   (a) Number and type of pilings removed, including the number of pilings (if any) that broke during removal.
   (b) Number, type, and diameter of any pilings installed (*e.g.*, untreated wood, treated wood, hollow steel).
   (c) Description of how pilings were installed and any sound attenuation measures used..

(6) Site preparation.
   (a) Total cleared area – riparian and upland.
   (b) Total new impervious area.

(7) Isolation of in-water work area, capture and release.
   (a) Supervisory fish biologist – name and address.
   (b) Methods of work area isolation and take minimization.
   (c) Stream conditions before, during and within one week after completion of work area isolation.
   (d) Means of fish capture.
   (e) Number of fish captured by species.
   (f) Location and condition of all fish released.
   (g) Any incidence of observed injury or mortality of listed species.

(8) Streambank protection.
   (a) Type and amount of materials used.
   (b) Project size – one bank or two, width and linear feet.

(9) Road construction, repairs and improvements. The justification for any new permanent road crossing design (*i.e.*, road realignment, full span bridge, streambed simulation, or no-slope design culvert).

(10) Water dependent structures and related features.
   (a) Area of new over-water structure.
   (b) Streambank distance to nearest existing water dependent structure -- upstream and down.

(11) Minor discharge and excavation/maintenance dredging.
   (a) Volume of dredged material.
   (b) Water depth before dredging and within one week of completion.
   (c) Verification of upland dredge disposal.

(12) Site restoration. Photo or other documentation that site restoration performance standards were met.

(13) Long-term habitat loss. The same elements apply as for monitoring site restoration.

iv. Site restoration or compensatory mitigation monitoring. In addition to the 120-day implementation report, each applicant will submit an annual report by December 31 that includes the written record documenting the date of each visit to a restoration site or mitigation site, and the site conditions and any corrective action taken during that visit. Reporting will continue from year to year until the Corps certifies that site restoration or compensatory mitigation performance standards have been met.

b. Operational program implementation monitoring. Collect and retain the following information for each project completed by the Corps using this Opinion.

   i. Project identification

      (1) Type of activity.

      (2) Project location, including any compensatory mitigation site(s), by 5th field HUC and by latitude and longitude as determined from the appropriate USGS 7-minute quadrangle map.

      (3) Corps contact person.

      (4) Starting and ending dates for work completed.

   ii. Photo documentation. Photos of habitat conditions at the project and any compensation site(s), before, during, and after project completion.[46]

      (1) Include general views and close-ups showing details of the project and project area, including pre and post construction.

      (2) Label each photo with date, time, project name, photographer's name, and a comment about the subject.

   iii. Other data. Additional project-specific data, as appropriate for individual projects.

      (1) Work cessation. Dates work ceased due to high flows, if any.

      (2) Fish screen. Evidence of compliance with NOAA Fisheries' fish screen criteria.

      (3) Pollution control. A summary of pollution and erosion control inspections, including any erosion control failure, contaminant release, and correction effort.

      (4) Drilling. A description of the drilling technology used, required access roads, and methods used to isolate all drilling operations and fluids from flowing water.

[46] Relevant habitat conditions may include characteristics of channels, eroding and stable streambanks in the project area, riparian vegetation, water quality, flows at base, bankfull and over-bankfull stages, and other visually discernable environmental conditions at the project area, and upstream and downstream of the project.

(5) Pilings.

(a) Number and type of pilings removed, including the number of pilings (if any) that broke during removal.

(b) Number, type, and diameter of any pilings installed (*e.g.*, untreated wood, treated wood, hollow steel).

(c) Description of how pilings were installed and any sound attenuation measures used..

(6) Site preparation.

(a) Total cleared area – riparian and upland.

(b) Total new impervious area.

(7) Isolation of in-water work area, capture and release.

(a) Supervisory fish biologist – name and address.

(b) Methods of work area isolation and take minimization.

(c) Stream conditions before, during and within one week after completion of work area isolation.

(d) Means of fish capture.

(e) Number of fish captured by species.

(f) Location and condition of all fish released.

(g) Any incidence of observed injury or mortality of listed species.

(8) Streambank protection.

(a) Type and amount of materials used.

(b) Project size – one bank or two, width and linear feet.

(9) Road construction, repairs and improvements. The justification for any new permanent road crossing design (*i.e.*, road realignment, full span bridge, streambed simulation, or no-slope design culvert).

(10) Water dependent structures and related features.

(a) Area of new over-water structure.

(b) Streambank distance to nearest existing water dependent structure -- upstream and down.

(11) Minor discharge and excavation/maintenance dredging.

(a) Volume of dredged material.

(b) Water depth before dredging and within one week of completion.

(c) Verification of upland dredge disposal.

(12) Site restoration. Photo or other documentation that site restoration performance standards were met.

(13) Long-term habitat loss. The same elements apply as for monitoring site restoration.

iv. Site restoration or compensatory mitigation monitoring. In addition to the 120-day implementation report, each applicant will submit an annual report by December 31 that includes the written record documenting the date of each visit to a restoration site or mitigation site, and the site conditions and any corrective action taken during that visit. Reporting will continue from year to year until the Corps certifies that site restoration or compensatory mitigation performance standards have been met.

c. Effectiveness monitoring. Gather any other data or analyses the Corps deems necessary or helpful to complete an assessment of habitat trends in stream and riparian conditions as a result of Corps permitted actions. The Corps may use existing monitoring efforts for this purpose if those efforts can provide information specific to the objective of identifying habitat trends.

d. Annual monitoring report. Provide NOAA Fisheries with an annual monitoring report by January 31 of each year that describes the Corps's efforts carrying out this Opinion. Separate projects into regulatory and operational groups, then summarize project-level monitoring information by activity and by 5th field HUC, with special attention to site restoration, streambank protection and compensatory mitigation. Also provide an overall assessment of program activity and cumulative effects. Submit a copy of the annual report to both the Oregon and Washington Offices of NOAA Fisheries.

Oregon State Director	Washington State Director
Habitat Conservation Division	Habitat Conservation Division
National Marine Fisheries Service	National Marine Fisheries Service
Attn: 2003/00850	**Attn: 2003/00850**
525 NE Oregon Street	510 Desmond Drive, SE, Suite 103
Portland, OR 97232	Lacey, WA 98503

e. Annual coordination. Meet with NOAA Fisheries by March 31 each year to discuss the annual monitoring report, including its regulatory and operational applications, and any action necessary to make the program more effective.

3. MAGNUSON-STEVENS ACT

3.1 Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance essential fish habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2)).

- NOAA Fisheries must provide conservation recommendations for any Federal or state action that would adversely affect EFH (§305(b)(4)(A)).

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: 'Waters' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; 'substrate' includes sediment, hard bottom, structures underlying the waters, and associated biological communities; 'necessary' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; 'spawning, breeding, feeding, or growth to maturity' covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of EFH

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for Federally-managed fisheries within the waters of Washington, Oregon, and California. Designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon and California, seaward to the boundary of the U.S. exclusive economic zone (370.4 km)(PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable artificial barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years) (PFMC 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 km) offshore of Washington, Oregon, and California north of Point Conception to the Canadian border (PFMC 1999).

Detailed descriptions and identifications of EFH are contained in the fishery management plans for groundfish (PFMC 1998a), coastal pelagic species (PFMC 1998b), and Pacific salmon (PFMC 1999). Casillas *et al.* (1998) provides additional detail on the groundfish EFH habitat complexes. NOAA Fisheries also has identified seven ground fish habitat complexes (estuarine, rocky shelf, non-rocky shelf, neritic zone, oceanic zone, continental slope/break and canyon) and identified species that may occur in each of those areas. The estuarine, rocky shelf, non-rocky shelf complexes are pertinent to this consultation.

- <u>Estuarine</u>: those waters, substrates and associated biological communities within bays and estuaries of the EEZ, from mean higher high water level (MHHW) or extent of upriver saltwater intrusion to the respective outer boundaries for each bay or estuary as defined in 33 CFR 80.1 (Coast Guard lines of demarcation). 18 species of groundfish, 4 coastal pelagic species, and 2 species of Pacific salmon (Table 4).
- <u>Rocky Shelf</u>: those waters, substrates, and associated biological communities living on or within ten meters (5.5 fathoms) overlying rocky areas, including reefs, pinnacles, boulders and cobble, along the continental shelf, excluding canyons, from MHHW to the shelf break (~200 meters or 109 fathoms deep). 35 species of groundfish, 5 coastal pelagic species, and 3 species of Pacific salmon (2 species of salmon south of Cape Flattery, WA) (Table 5).
- <u>Non-Rocky Shelf</u>: those waters, substrates, and associated biological communities living on or within ten meters (5.5 fathoms) overlying the substrates of the continental shelf, excluding the rocky shelf and canyon composites, from MHHW to the shelf break (~200 meters or 109 fathoms deep). 41 species of groundfish, 5 coastal pelagic species, and 3 species of Pacific salmon (2 species of salmon south of Cape Flattery, WA) (Table 6).

3.3 Proposed Actions

The proposed action and action area are detailed above in section 1 of this Opinion. The action area includes habitats that have been designated as EFH for various life-history stages of groundfish, coastal pelagic species, and Pacific salmon. Table 7 lists all of the species with designated EFH that may be found in the action area.

3.4 Effects of Proposed Action

As described in detail in section 2 of this Opinion, the proposed action may result in adverse effects to a variety of habitat parameters.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action will adversely affect the EFH for the groundfish, coastal pelagic, and Pacific salmon species listed in Table 7.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. The terms and conditions outlined in section 2 are generally applicable to designated EFH for the species in Table 7, and address these adverse effects. Consequently, NOAA Fisheries incorporates them here as EFH conservation measures.

3.7 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The Corps must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(k)).

Table 4. Species with Designated EFH in the Estuarine EFH Composite

Groundfish Species	
Leopard Shark (southern OR only)	*Triakis semifasciata*
Soupfin Shark	*Galeorhinus zyopterus*
Spiny Dogfish	*Squalus acanthias*
California Skate	*Raja inornata*
Spotted Ratfish	*Hydrolagus colliei*
Lingcod	*Ophiodon elongatus*
Cabezon	*Scorpaenichthys marmoratus*
Kelp Greenling	*Hexagrammos decagrammus*
Pacific Cod	*Gadus macrocephalus*
Pacific Whiting (Hake)	*Merluccius productus*
Black Rockfish	*Sebastes maliger*
Bocaccio	*Sebastes paucispinis*
Brown Rockfish	*Sebastes auriculatus*
Copper Rockfish	*Sebastes caurinus*
Quillback Rockfish	*Sebastes maliger*
English Sole	*Pleuronectes vetulus*
Pacific Sanddab	*Citharichthys sordidus*
Rex Sole	*Glyptocephalus zachirus*
Rock Sole	*Lepidopsetta bilineata*
Starry Flounder	*Platichthys stellatus*
Coastal Pelagic Species	
Pacific Sardine	*Sardinops sagax*
Pacific (Chub) Mackerel	*Scomber japonicus*
Northern Anchovy	*Engraulis mordax*
Jack Mackerel	*Trachurus symmetricus*
California Market Squid	*Loligo opalescens*
Pacific Salmon Species	
Chinook Salmon	*Oncorhyncus tshawytcha*
Coho Salmon	*Oncorhyncus kisutch*

Table 5. Species with Designated EFH in the Rocky Shelf EFH Composite

Groundfish Species			
Leopard Shark (southern OR only)	*Triakis semifasciata*	Redstripe Rockfish	*S. proriger*
Soupfin Shark	*Galeorhinus zyopterus*	Rosethorn Rockfish	*S. helvomaculatus*
Spiny Dogfish	*Squalus acanthias*	Rosy Rockfish	*S. rosaceus*
Spotted Ratfish	*Hydrolagus colliei*	Rougheye Rockfish	*S. aleutianus*
Lingcod	*Ophiodon elongatus*	Sharpchin Rockfish	*S. zacentrus*
Cabezon	*Scorpaenichthys marmoratus*	Shortbelly Rockfish	*S. jordani*
Kelp Greenling	*Hexagrammos decagrammus*	Shortraker Rockfish	*S. borealis*
Sablefish	*Anoplopoma fimbria*	Silvergray Rockfish	*S. brevispinis*
Aurora Rockfish	*Sebastes aurora*	Speckled Rockfish (southern OR only)	*S. ovalis*
Bank Rockfish (southern OR only)	*S. rufus*	Splitnose Rockfish	*S. diploproa*
Black Rockfish	*Sebastes maliger*	Squarespot Rockfish (southern OR only)	*S. hopkinsi*
Black-and-yellow Rockfish (southern OR only)	*S. chrysomelas*	Stripetail Rockfish	*S. saxicola*
Blackgill Rockfish	*S. melanostomus*	Tiger Rockfish	*S. nigrocinctus*
Blue Rockfish	*S. mystinus*	Vermilion Rockfish	*S. miniatus*
Bocaccio	*S. paucispinis*	Widow Rockfish	*S. entomelas*
Brown Rockfish	*S. auriculatus*	Yelloweye Rockfish	*S. ruberrimus*
Canary Rockfish	*S. pinniger*	Yellowmouth Rockfish	*S. reedi*
Chilipepper	*S. goodei*	Yellowtail Rockfish	*S. flavidus*
China Rockfish	*S. nebulosus*	Shortspine Thornyhead	*Sebastolobus alascanus*
Copper Rockfish	*S. caurinus*	English Sole	*Pleuronectes vetulus*
Cowcod	*S. levis*	Rock Sole	*Lepidopsetta bilineata*
Darkblotched Rockfish	*S. crameri*		
Flag Rockfish	*S. rubrivinctus*	**Coastal Pelagic Species**	
Gopher Rockfish (southern OR only)	*S. carnatus*	Pacific Sardine	*Sardinops sagax*
Grass Rockfish (southern OR only)	*S. rastrelliger*	Pacific (Chub) Mackerel	*Scomber japonicus*
Greenspotted Rockfish	*S. chlorostictus*	Northern Anchovy	*Engraulis mordax*
Greenstriped Rockfish	*S. elongatus*	Jack Mackerel	*Trachurus symmetricus*
Harlequin Rockfish (northern OR only)	*S. variegatus*	California Market Squid	*Loligo opalescens*
Longspine Thornyhead	*Sebastolobus altivelis*		
Pacific Ocean Perch	*S. alutus*	**Pacific Salmon Species**	
Pink Rockfish (southern OR only)	*S. eos*	Chinook Salmon	*Oncorhyncus tshawytcha*
Quillback Rockfish	*S. maliger*	Coho Salmon	*Oncorhyncus kisutch*
Redbanded Rockfish	*S. babcocki*		

Table 6. Species with Designated EFH in the Non-Rocky Shelf EFH Composite

Groundfish Species					
Leopard Shark (southern OR only)	*Triakis semifasciata*	Shortraker Rockfish	*S. borealis*	Quillback Rockfish	*S. maliger*
Soupfin Shark	*Galeorhinus zyopterus*	Shortspine Thornyhead	*Sebastolobus alascanus*	Redbanded Rockfish	*S. babcocki*
Spiny Dogfish	*Squalus acanthias*	Silvergray Rockfish	*S. brevispinis*	Rosethorn Rockfish	*S. helvomaculatus*
Big Skate	*Raja binoculata*	Splitnose Rockfish	*S. diploproa*	Rougheye Rockfish	*S. aleutianus*
California Skate	*Raja inornata*	Stripetail Rockfish	*S. saxicola*	Sharpchin Rockfish	*S. zacentrus*
Longnose Skate	*Raja rhina*	Vermilion Rockfish	*S. miniatus*	Shortbelly Rockfish	*S. jordani*
Spotted Ratfish	*Hydrolagus colliei*	Widow Rockfish	*S. entomelas*	Greenspotted Rockfish	*S. chlorostictus*
Pacific Rattail	*Coryphaenoides acrolepis*	Yellowtail Rockfish	*S. flavidus*	**Coastal Pelagic Species**	
Lingcod	*Ophiodon elongatus*	Arrowtooth Flounder	*Atheresthes stomias*	Northern Anchovy	*Engraulis mordax*
Pacific Cod	*Gadus macrocephalus*	Butter Sole	*Isopletta isolepis*	Pacific Sardine	*Sardinops sagax*
Sablefish	*Anoplopoma fimbria*	Curlfin Sole	*Pleuronichthys decurrens*	Pacific Mackerel	*Scomber japonicus*
Aurora Rockfish	*Sebastes aurora*	Dover Sole	*Microstomus pacificus*		
Bank Rockfish (southern OR only)	*S. rufus*	English Sole	*Pleuronectes vetulus*	Jack Mackerel	*Trachurus symmetricus*
Black Rockfish	*S. maliger*	Flathead Sole	*Hippoglossoides elassodon*	California Market Squid	*Loligo opalescens*
Blue Rockfish	*S. mystinus*	Pacific Sanddab	*Citharichthys sordidus*		
Bocaccio	*S. paucispinis*	Petrale Sole	*Eopsetta jordani*		
Canary Rockfish	*S. pinniger*	Rex Sole	*Glyptocephalus zachirus*	**Pacific Salmon Species**	
Chilipepper	*S. goodei*	Rock Sole	*Lepidopsetta bilineata*	Chinook Salmon	*Oncorhyncus tshawytcha*
Copper Rockfish	*S. caurinus*	Sand Sole	*Psettichthys melanostictus*	Coho salmon	*O. kisutch*
Cowcod	*S. levis*	Starry Flounder	*Platichthys stellatus*		
Darkblotched Rockfish	*S. crameri*	Greenstriped Rockfish	*S. elongatus*		
Gopher Rockfish (southern OR only)	*S. carnatus*	Pacific Ocean Perch	*S. alutus*		
Grass Rockfish (southern OR only)	*S. rastrelliger*	Pink Rockfish (southern OR only)	*S. eos*		

Table 7. Species with Designated EFH Affected by This Consultation.

GROUND FISH SPECIES	Blue rockfish (*S. mystinus*)	Rougheye rockfish (*S. aleutianus*)	Flathead sole (*Hippoglossoides elassodon*)
Leopard shark (*Triakis semifasciata*)	Bocaccio (*S. paucispinis*)	Sharpchin rockfish (*S. zacentrus*)	Pacific sanddab (*Citharichthys sordidus*)
Soupfin shark (*Galeorhinus zyopterus*)	Brown rockfish (*S. auriculatus*)	Shortbelly rockfish (*S. jordani*)	Petrale sole (*Eopsetta jordani*)
Spiny dogfish (*Squalus acanthias*)	Canary rockfish (*S. pinniger*)	Shortraker rockfish (*S. borealis*)	Rex sole (*Glyptocephalus zachirus*)
Big skate (*Raja binoculata*)	Chilipepper (*S. goodei*)	Silvergray rockfish (*S. brevispinus*)	Rock sole (*Lepidopsetta bilineata*)
California skate (*R. inornata*)	China rockfish (*S. nebulosus*)	Speckled rockfish (*S. ovalis*)	Sand sole (*Psettichthys melanostictus*)
Longnose skate (*R. rhina*)	Copper rockfish (*S. caurinus*)	Splitnose rockfish (*S. diploproa*)	Starry flounder (*Platyichthys stellatus*)
Ratfish (*Hydrolagus colliei*)	Darkblotched rockfish (*S. crameri*)	Stripetail rockfish (*S. saxicola*)	
Pacific rattail (*Coryphaenoides acrolepsis*)	Grass rockfish (*S. rastrelliger*)	Tiger rockfish (*S. nigrocinctus*)	**COASTAL PELAGIC SPECIES**
Lingcod (*Ophiodon elongatus*)	Greenspotted rockfish (*S. chlorostictus*)	Vermillion rockfish (*S. miniatus*)	Northern anchovy (*Engraulis mordax*)
Cabezon (*Scorpaenichthys marmoratus*)	Greenstriped rockfish (*S. elongatus*)	Widow Rockfish (*S. entomelas*)	Pacific sardine (*Sardinops sagax*)
Kelp greenling (*Hexagrammos decagrammus*)	Longspine thornyhead (*Sebastolobus altivelis*)	Yelloweye rockfish (*S. ruberrimus*)	Pacific mackerel (*Scomber japonicus*)
Pacific cod (*Gadus macrocephalus*)	Shortspine thornyhead (*Sebastolobus alascanus*)	Yellowmouth rockfish (*S. reedi*)	Jack mackerel (*Trachurus symmetricus*)
Pacific whiting (Hake) (*Merluccius productus*)	Pacific Ocean perch (*S. alutus*)	Yellowtail rockfish (*S. flavidus*)	Market squid (*Loligo opalescens*)
Sablefish (*Anoplopoma fimbria*)	Quillback rockfish (*S. maliger*)	Arrowtooth flounder (*Atheresthes stomias*)	
Aurora rockfish (*Sebastes aurora*)	Redbanded rockfish (*S. babcocki*)	Butter sole (*Isopsetta isolepsis*)	**SALMON**
Bank Rockfish (*S. rufus*)	Redstripe rockfish (*S. proriger*)	Curlfin sole (*Pleuronichthys decurrens*)	Coho salmon (*O. kisutch*)
Black rockfish (*S. melanops*)	Rosethorn rockfish (*S . helvomaculatus*)	Dover sole (*Microstomus pacificus*)	Chinook salmon (*O. tshawytscha*)
Blackgill rockfish (*S. melanostomus*)	Rosy rockfish (*S. rosaceus*)	English sole (*Parophrys vetulus*)	

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